TECHNOLOGY DEPT.

Grinding and Finishing

april 1958

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Internal Grinding at McGill —page 20

Part II. Cleaning of Grinding and Finishing Coolants —page 24

Increased Life and Accuracy of Diamond Dressers Achieved by Diamond Cutting and Orientation —page 31

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Bryant Centalign for internal grinding operation at McGill Mfg. Co.

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MATTISON
MACHINE WORKS
ROCKFORD ILL. U.S.A.

GRINDING METHODS

When you want to machine flat surfaces

consider the profitability of high-powered surface grinding: lower tool costs . . . simpler work handling . . . faster machining!

262 high-speed steel reamer blades are ground every chuck load, holding size and flatness within .0003 in. Wheel is set dead flat, producing 10 to 12 micro inch finish, using a 60-grit segmental wheel.

Two sides of hardened steel retainer rings are ground at 100 per hour, holding size to plus .000, minus .003 in. Stock removal is .030 in.

Change from milling to surface grinding saved 22¢ per piece on 4140 drop-forged chain links. Production is 100 pieces per hour, with .140 in. stock removal. Saving in cutter maintenance alone is 16¢ per part.

The more metal you machine, the higher the cost. This is why many companies are switching to high-powered surface grinding for machining flat surfaces ordinarily milled, planed, or broached.

And why not? The grinder will take them from the rough, getting under tough scale and cutting through hard spots with no danger of tool breakage. It's often only a matter of reducing stock allowances or a slight redesign of the part to make an ideal grinding job. With castings costing by the pound, the savings in material costs alone can make grinding an attractive investment.

What's new in surface grinding that challenges other stock-removal methods? There are two things: (1) Grinding wheels are tougher, and (2) machines are available with spindle motors up to 150 hp and more than enough rigidity to apply this power profitably.

Take the Mattison Vertical-Spindle Rotary, for example. Spindle motors up to 60 hp are being used. Large, uninterrupted surfaces such as those shown above are being ground with a minimum of wheel clearance. This means greater flatness. Finishing cuts are taken with the wheels set dead flat. High unit pressures keep the wheel self-dressing, hogging off metal with an open structure wheel. This eliminates wheel loading and reduces surface checking. Think of what this means in terms of tool cost when machining tough forgings and castings from the rough. Not only is tool breakage eliminated, you save sharpening costs and reduce downtime.

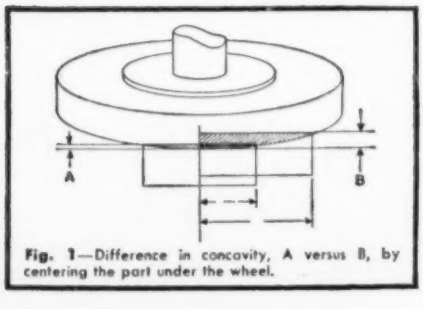


Fig. 1—Difference in concavity, A versus B, by centering the part under the wheel.

Three faces of cast-iron chain cases are ground in one setup at 13 per hour. Stock removal is ⅛ in. Parallelism is within .001 in. Accuracy is held to .002 in., with automatic sizing.

43 in. diameter Meehanite clutch plates, with 12½ in. uninterrupted friction surface, are ground with wheel set dead flat, using 60-hp spindle motor. Stock removal is .020 in.

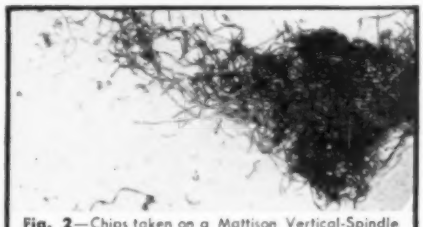
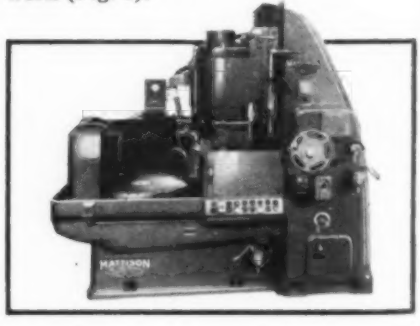


Fig. 2—Chips taken on a Mattison Vertical-Spindle Rotary Surface Grinder illustrate positive cut by applying proper horsepower.

Another factor is direct costs. On a surface grinder, large or small pieces can be set up on a magnetic chuck and ground in less time than it takes the operator to locate them and clamp them in a fixture. But perhaps the greatest saving is in reduced scrap or increased accuracy for faster assembly of your product. This happens often, especially on thin-walled parts where an interrupted cut by a conventional cutting tool overstresses the part, or where clamping pressures distort the part prior to machining.

If you are interested in improving accuracy and stock removal, don't forget Mattison's exclusive head-tilting arrangement. With it you can get maximum flatness for your optimum loading arrangement by centering the low point of the leading edge of the wheel on the work (Fig. 1).



Fact File on Grinding

Typical parts, setups, and performance reports illustrate flexibility of high-powered surface grinding. Ask for a copy of "Setups," and address your letter to, or call,

MATTISON MACHINE WORKS

Rockford, Illinois • Phone: 2-5521

Contents • April 1958

grinding and finishing

the magazine of abrasive metalworking operations

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BPA

FEATURE ARTICLES

Internal Grinding at McGill 20
Production is keyed to customer order rather than stock. Variation in size and design of bearings as well as lots makes a unique production situation. By James B. Pond.

Part II—The Cleaning of Grinding and Finishing Coolants 24
The accepted methods of cleaning are reviewed. The advantages of each method are evaluated. By Arthur L. Wilson.

Increased Life and Accuracy of Diamond Dresser Achieved by Diamond Cutting and Orientation 31
Using the diamond in only the hardest direction and in the form of a slab eliminates fading and resetting. By H. C. Miller.

How to Flat Polish Stainless Steel 34
Stainless steel sheets from pickling to a No. 8 finish. By Thomas C. Smith.

Reduced Costs, Better Finish and Higher Production 37
AiResearch Mfg. Div. of the Garrett Corp. solved their problem of increasing production and higher degree of tolerance and uniformity by barrel finishing.

Precision Belt Grinding of Piston Rods and Cylinders 38
A surface finish of 8 micro-inches, a tolerance of .0005 inches and an increased production of 300% is accomplished by belt grinding.

ASTE Tool Show—Abrasive Equipment to be Shown 45

DEPARTMENTS

Letters 4
Industrial Observer 6
Editor's Page 19
Free Literature 61
New Equipment and Materials 67
News of Industry 75

Advertisers Index and District Managers listed on Return Card Insert

—NEXT MONTH—

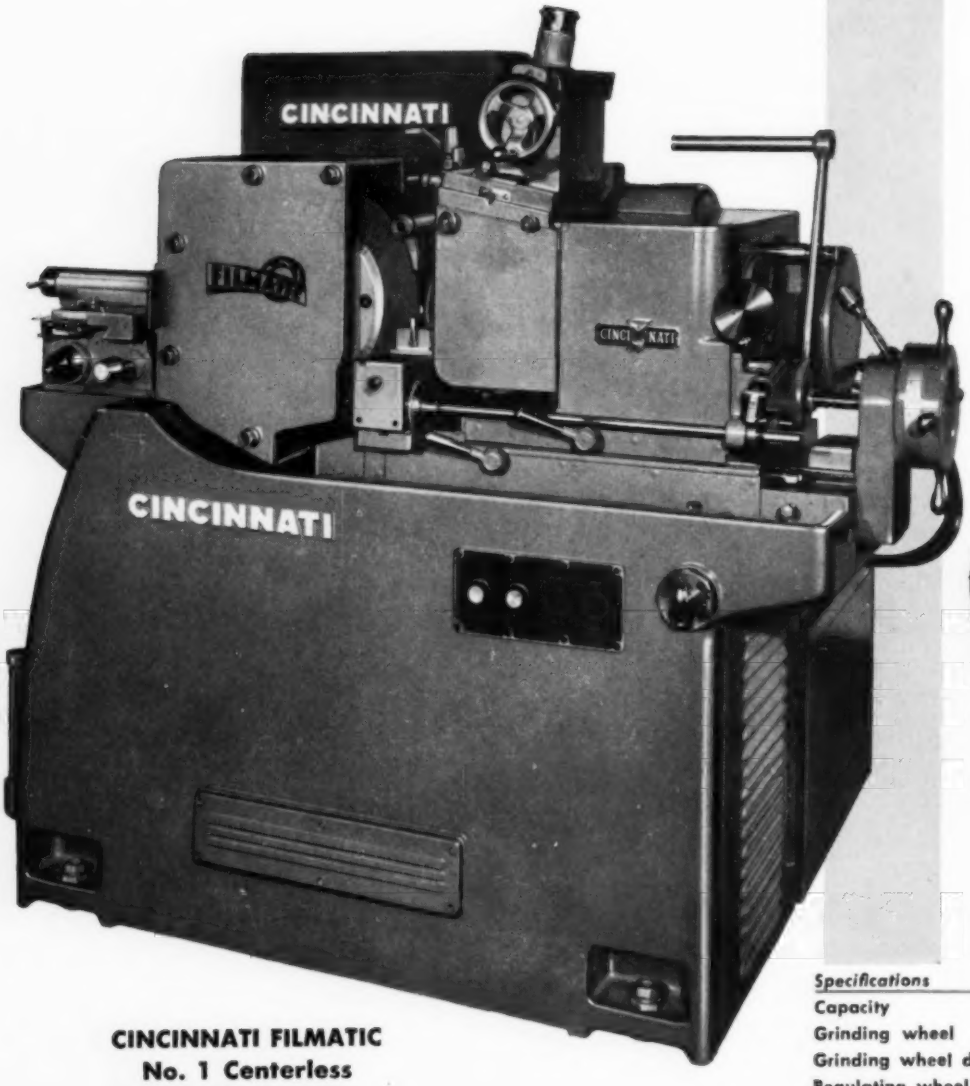
Your Questions Answered

Answers to your questions will be provided by Arthur Rakestraw. A graduate of Purdue University, "Rake" has spent 27 years as an abrasive engineer. During World War II he set up abrasive lines in five plants throughout the country.

Your questions are welcome! Please furnish all information available.

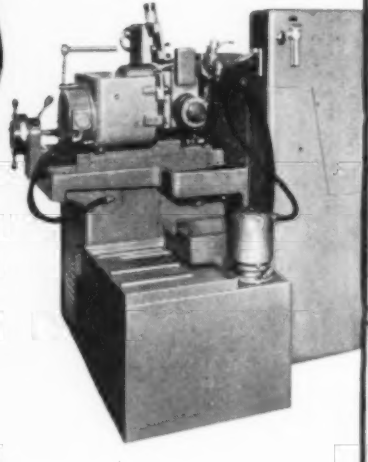
No. 1

. . . a new size in the Cincinnati Filmatic Line of



CINCINNATI FILMATIC
No. 1 Centerless
Grinding Machine
Catalog No. G-703

Accessible grinding fluid tank and engineered electrical control cabinet are evident in the rear view.



Specifications	
Capacity	0 to 1½" diam.
Grinding wheel	16" diam. x 4" wide
Grinding wheel drive	7½ hp
Regulating wheel speeds	22 to 300 rpm
Floor space (standard)	63" x 61"

CINCINNATI®

CENTERTYPE GRINDING MACHINES • CENTERLESS GR
ROLL GRINDING MACHINES • SURFACE GRINDING MAC

# of Fine Centerless Grinding Machines

Cincinnati, the world's most experienced builder of centerless grinding machines, presents the new No. 1 size. It has the potential to reduce costs in every shop concerned with precision cylindrical grinding of parts ranging up to 1½" diameter. Many interesting features and construction details give these machines the highest performance rating:

Exclusive FILMATIC grinding wheel spindle bearings . . . over 99% of these bearings on all CINCINNATI Grinding Machines have never required service

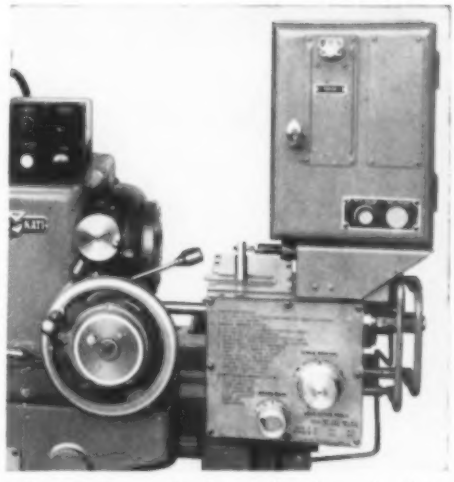
Swivel mounted regulating wheel unit . . . reduces set-up time

Automatic and oil shot lubrication

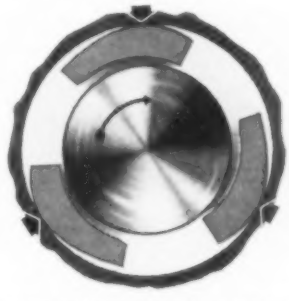
Engineered electrical control cabinet . . . controls are protected from damage and tampering

Selection of nineteen attachments and extra equipment items . . . spindle axial adjustment, crush truing, automatic grinding wheel spindle reciprocation, etc.

Many additional features, advantages and complete specifications will be found in catalog No. G-703. And Cincinnati gives you an additional advantage not found in catalogs—ENGINEERING SERVICE. ¶ Cincinnati is ready to study your precision grinding methods and recommend improvements wherever possible. May we hear from you?

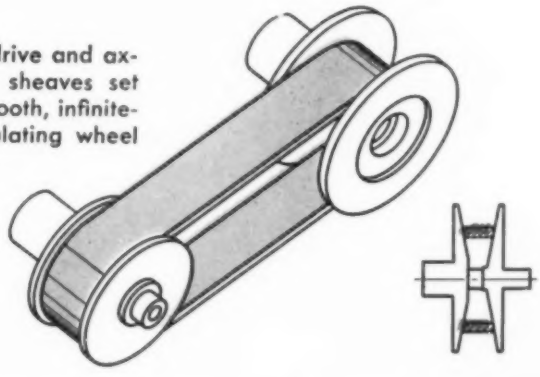


For high production infeed work, the Electro-Hydraulic Automatic Infeed Attachment is a top-notch performer. Infeed rates and stock removal are dial adjusted.



FILMATIC grinding wheel spindle bearings just never wear out or require adjustment.

V-belt primary drive and axially adjustable sheaves set the stage for smooth, infinitely variable regulating wheel speeds.



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CINCINNATI 9, OHIO

Famous Perfection Grinding Live Center

Accurate Detachable Points H.S.S. and Carbide

Expansion Compensating Lathe Centers

ANNOUNCING THE FIRST COMPLETE LINE OF PRECISION - BUILT LIVE CENTERS

INCLUDING 5 TYPES OF . . . .

EXPANSION COMPENSATION CENTERS

- the only complete line
- the only guaranteed self-adjusting live center

INTRODUCING J & S Tool Company's complete new line of live centers with accuracy better than .0001", with these features:

- Guaranteed one year.
- Self-adjusting bearing take-up.
- RPM speeds up to capacity of present-day machines.
- Correct capacity rating.
- Hardened and ground throughout.

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Letters to the Editor

Surface Grinding

Will you be kind enough to add the following names to your mailing list to receive your excellent magazine, *Grinding and Finishing*.

* * *

For your information, we operate steel plate divisions at both Akron and Dayton and an important part of our total operations at both plants consists of steel plate surface grinding.

* * *

I have just received a copy of the February issue and was very much interested in studying the articles, "The How and Why of Abrasive Wheels" and "How Gibson Refrigeration Grinds and Laps in One Operation." Both stories are very informative. . . .

Your cooperation shall be greatly appreciated.

R. A. Kyle, Vice-Pres. & Mgr.,
Steel Plate Division
The Burger Iron Co.

NAMES WERE APPRECIATED AND ADDED TO THE MAILING LIST.

Automatic Barrel Finishing

I have just finished reading two interesting articles in borrowed copies of your *Grinding and Finishing* magazine. The articles that I am referring to are "Automatic Barrel Finishing at I.B.M." and "How Ford Aircraft Saves Money on Deburring Operations."

If they are available, I would appreciate receiving tear sheets on the articles mentioned above.

Due to our keen interest in all phases of metal finishing, may I be placed on your mailing list for future editions of your fine magazine?

Dexter W. Jordan
Process Engineer
Marine Division
Sperry Gyroscope Company

TEAR SHEETS WERE SENT.

Grind more carbide tools per wheel and grind them better with Cortland

POROUS TYPE GREEN CARBORA WHEELS

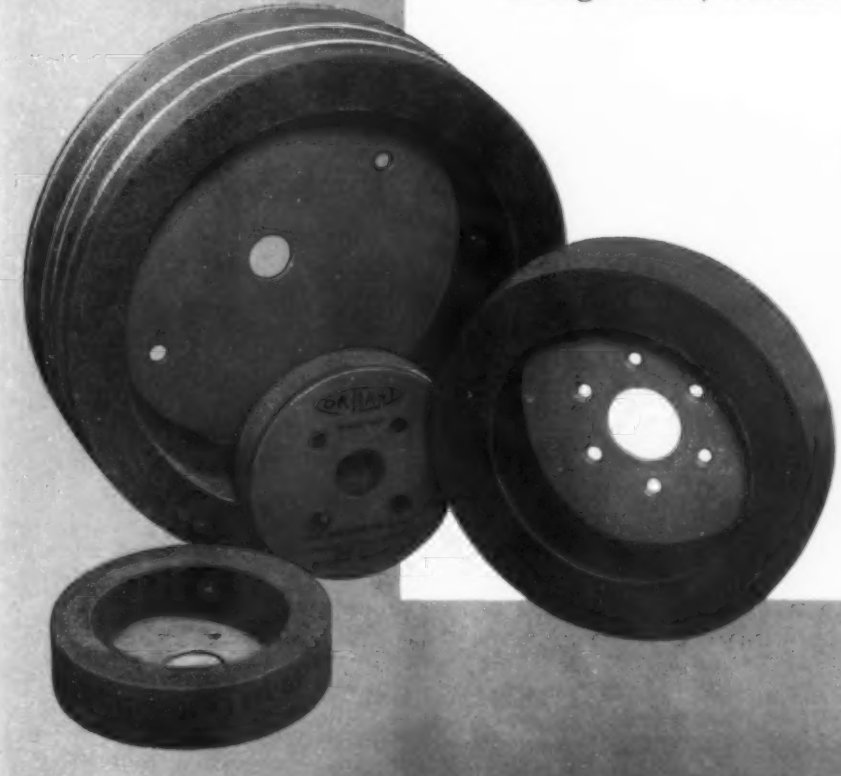
THIS WHEEL

will not leave our factory unless all specifications for grade, uniformity, truth, balance and strength have been met.

Your costly carbide tools will give better performance and last longer when properly ground. To obtain proper grinding, use Cortland plate-mounted Green Carbora porous type wheels. Uniformly induced porosity throughout the wheel provides adequate chip clearance and insures fast stock removal. The sharp, cool cutting "green grit", together with Cortland's special carbide wheel bonds, produces the required finish and a longer lasting cutting edge on the tools. Wheels are securely vulcanized to steel backing plates.

For fast service the following standard sizes are carried in stock: 6 x 1 x 4, 7 x 1½ x 5, 10 x 2 x 7 and 14 x 4 x 11.

Cortland carbide grinding wheels are also available in straight sizes, recessed types and cups.



CORTLAND GRINDING WHEELS CORPORATION

Chester, Massachusetts

Do you have a grinding problem? If so, we are sure we can help you — with a Cortland **job-engineered** wheel. Let's get together.

CORTLAND

Industry Observer

Elevated superhighways with monorails suspended beneath them may carry inter-city motorists and train commuters in the year 2000 on a single, rifle-straight "transportation core in the sky," General Motors suggested today. GM President Harlow H. Curtice disclosed that this concept will be introduced as an operating model in one of the GM exhibits at the Brussels Universal and International Exhibition of 1958 which opens April 17.

This transportation core is envisioned as tri-level. The top two levels are three-lane, electronically controlled highways, one carrying vehicle traffic in each direction. Beneath the lower highway is suspended a two-way monorail commuter train system. Such highways would be ultra-safe because all vehicles would be under complete electronic guidance.

Crucible Steel Company of America acquired full ownership of Rem-Cru Titanium, Inc. from Remington Arms Company, according to the announcement.

The transaction involved an exchange of 150,000 shares of newly-issued crucible stock for 5,000 shares of stock and $2,800,000 in notes of Rem-Cru, according to the plan announced. The Securities and Exchange Commission has granted approval of the transaction.

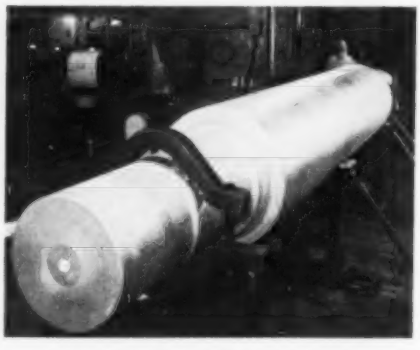
Crucible President Joel Hunter stated, "Rem-Cru will be integrated with Crucible to effect important economies in operation . . . We expect the new titanium division to operate at a profit even in the period of low demand which is ahead, and Crucible has acquired properties which are needed for growth in special steels."

Presidents of major U. S. industrial corporations earn an average of $111,500 a year in direct compensation and, after taxes and living expenses, have from 16% to 20% left for investment or other voluntary spending. These are highlights from a new survey of 109 company presidents made by *Dun's Review and Modern Industry,* March 1958 issue. The article also contains a detailed report on the company president's biggest personal financial worries, what motivates young executives most effectively, and what changes should and could be made in the present personal and business income tax laws.

Test Tube for High Pressure Studies—Government scientists are conducting important experiments inside a flawless, 7½-carat diamond, a rare and perfect "type 2" stone. In a needle-sized hole drilled through the gem, they are testing materials at pressures as great as 450,000 lb. to the square inch.

The diamond serves as one of many pressure chambers being used at the National Bureau of Standards, Department of Commerce, in studies of what happens to materials under great heat and stress.

The NBS is conducting this basic research for the benefit of the military services and industry, under conditions that simulate the extraordinary heat and pressure that attend an atomic explosion or the launching of a guided missile.



ONE OF THE LARGEST HARDENED AND GROUND FORGED STEEL ROLLS ever made by Bethlehem Steel Company is almost ready for shipment from the company's Bethlehem, Pa., plant. The first in an order of four, the roll weighs 68,000 lbs., has a body diameter of 38", measures 288" length over-all, and has a working face of 168". The four rolls will be used in a mill for hot rolling aluminum sheet and plate.

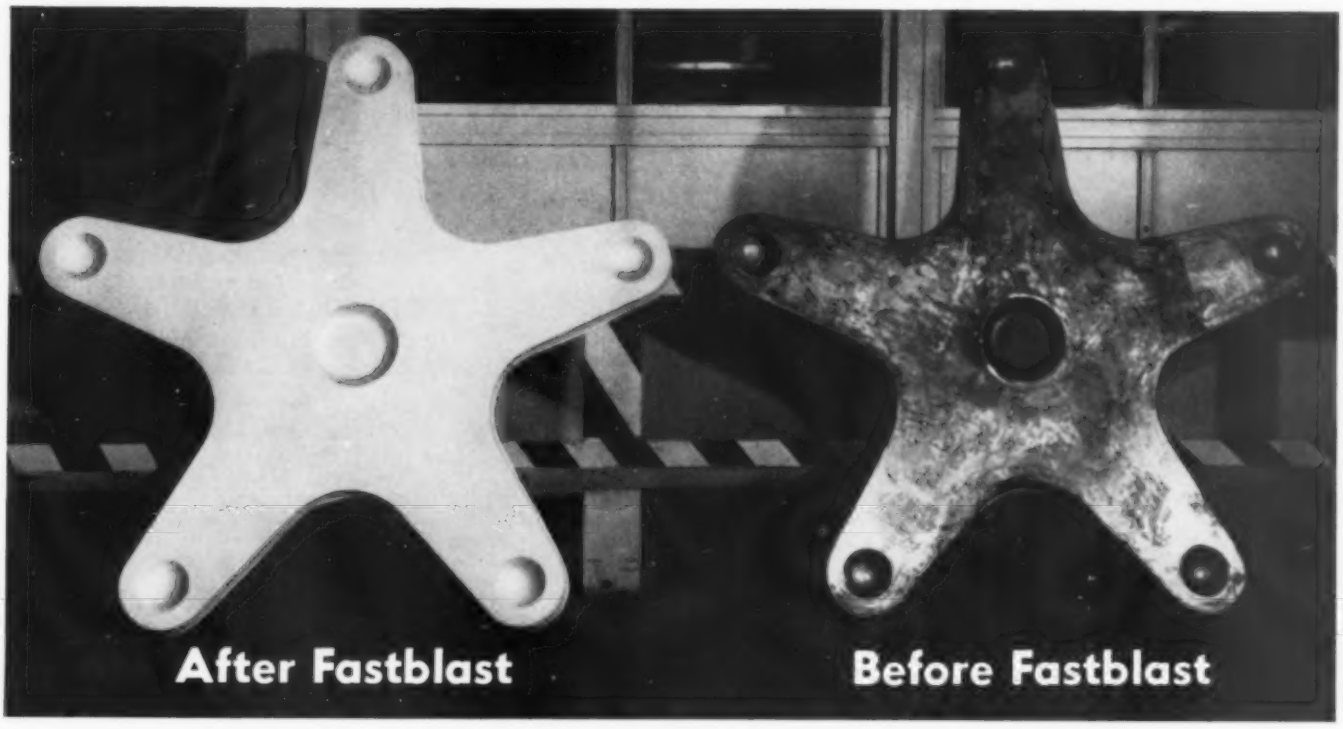
A newly-formed division of Ford Motor Co., designated the M-E-L Division, has been assigned responsibility for all the company's products in the medium-price, luxury, and imported car markets, Henry Ford II, president, announced. James J. Nance has been appointed vice president and general manager of the division. He will have charge of four of the company's U.S.-made car lines, and marketing of the English Ford line.

Consumption of new rubber, both natural and synthetic, in the United States is expected to reach 1,635,000 long tons by 1960—an increase of 151% in the 20 years since man-made rubber came into general use, according to the annual report of The Goodyear Tire & Rubber Co. As it becomes apparent there will be a shortage of natural rubber in the next decade, Goodyear's program for meeting this problem is the synthesis of Natsyn rubber. Goodyear's synthetic plants at Houston, Texas, and Akron, Ohio were expanded by 50% during 1957, providing a total production capacity of 247,500 tons annually.

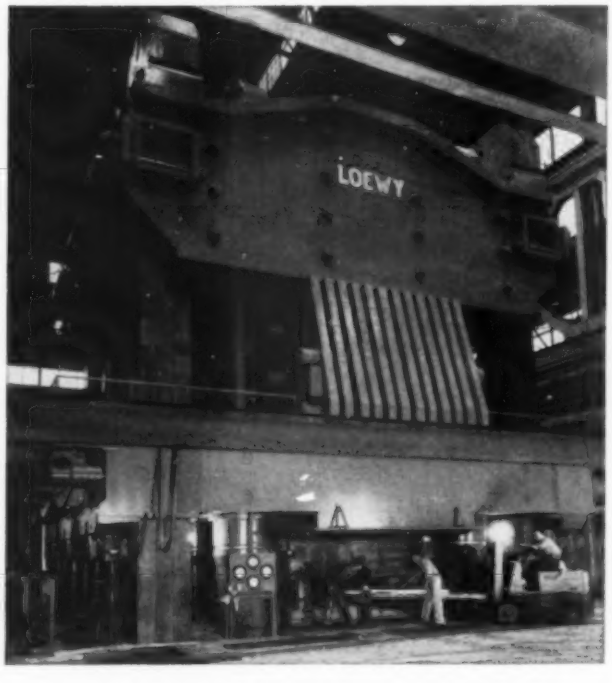
Use of Automatic Controls widened in 1957—Broader application by U.S. industry of automatic controls to include more processing functions was a significant development during 1957 in improving production techniques, according to Henry F. Dever, vice-president of Minneapolis-Honeywell's Industrial Products Group. Sharper competition and the increasing expenditure for research and development of new products have been important factors in enlarging the use of instruments that indicate, record, and control a wide variety of physical and chemical conditions vital to production, he said.

The American Foundrymen's Society, Des Plaines, Ill., offers two regional technical courses for upgrading progressive foundry personnel. Entitled "Cupola Melting of

Clean Forgings Fast with Exolon Fastblast

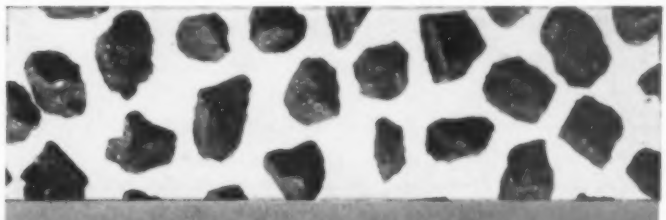


Wyman-Gordon Company cleans these Helicopter Hub Rotor Magnesium Forgings by pressure blasting with Fastblast



Above: Hub Rotor forgings were produced on this 50,000 ton hydraulic forging press at North Grafton, Mass. plant of Wyman-Gordon — U.S.A.F. It is 10 stories high, 48 feet above and more than 60 feet below the floor.

These large helicopter hubs come out of the forging dies covered with grease and graphite. Air pressure blasting with EXOLON Fastblast, a 100% new aluminum oxide abrasive, quickly cleans them. Fastblast grains are strong, sharp and clean . . . free from weak particles and "lazy" fines and splinters. It's a tough abrasive, that breaks down slowly so that its reclaim value is high. Fastblast can be used over and over again. Fastblast saves time and money. Write for complete information.



Above: Photomicrograph of Fastblast. Shows tough, hard grains that cut faster and last longer.

The EXOLON Company

1002 East Niagara Street • Tonawanda, N. Y.

Manufacturers of SILICON CARBIDE and ALUMINUM OXIDE ABRASIVES

The following cost reductions are substantiated by "in shop" tests:*

1. Increased production
2. Improved finish and controlled accuracy of work pieces
3. Reduction of coolant waste
4. Elimination of systems cleaning
5. Abatement of dermatitis in workers
6. Improved machine cleanliness
7. Prolonged accuracy of tools
8. Longer tool or abrasive wheel life expectancy
9. Reduced wheel loading and wheel dressing
10. Maximum recovery of precious (diamond) swarf
11. Reduced swarf handling and shipping costs
12. Reduction in parts cleaning costs

VISIT OUR BOOTH '58 ASTE TOOL SHOW

BOOTH 1062

The "ALSOP METHOD" of sub-micron filtration on coolants, cutting oils and hydraulics is obtained with compact—large area—volume capacity units.

May we have our representative call and discuss a trial demonstration in your plant? No obligation of course.

A request on your letterhead will open these avenues for you.

*Engineering Bulletins on Request

ALSOP ENGINEERING CORPORATION

Industry Observer . . .

(Continued from page 6)

Iron," the course was presented, first, at Berkeley, Calif., and then in Hamilton, Ont., Can.

The AFS Training and Research Institute came into being late in 1956, but the tremendous reception of the castings industry for in-plant training courses prompted the extension of the program. Competent qualified experts in specific areas are carefully selected to teach T & I courses with authoritative accuracy acquired from experience.

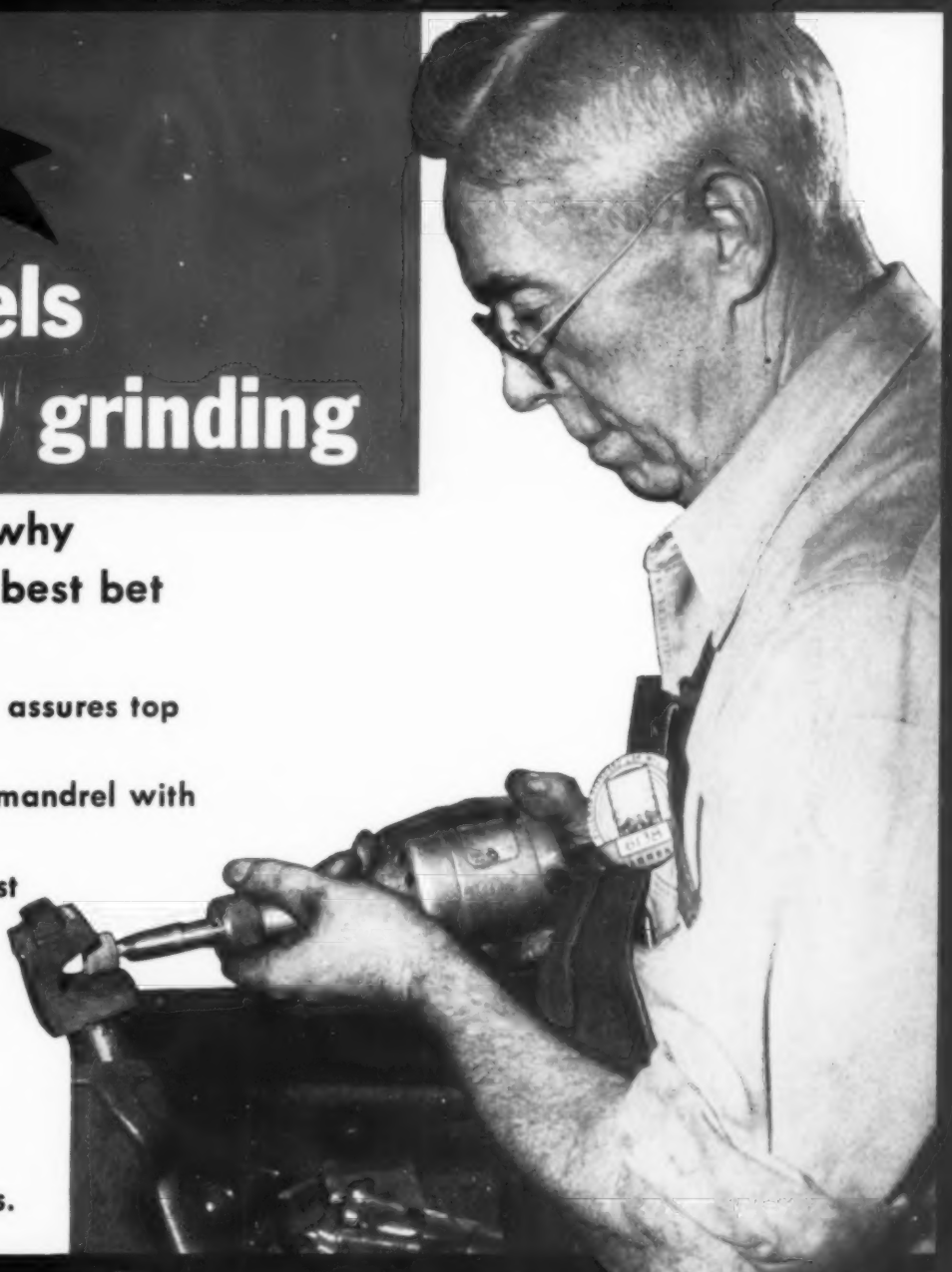
The Du Pont Co. spent $220 million in 1957 in construction and expansion of plants, laboratories, and service units, and attained sales of $1,965 million, both record highs for the company, it was disclosed by Crawford H. Greenewalt, president, in his annual report to the more than 200,000 stockholders. Increased demand for the company's products occurred in many lines but especially in sales to the textile industry. Six new plants are reported under construction. Among the products involved in the expansion are nylon, "Orlon" acrylic staple, cellophane, titanium pigments, etc.

AFS Casting Congress, to be conducted simultaneously with the 1958 Foundry Show in Cleveland Public Auditorium, Cleveland, Ohio, May 19-23, will present 100 technical papers. There will be sessions devoted to the latest findings in steel, the newest techniques in patternmaking, educational pursuits, and fundamental papers.

"Industrial Research and Development Today" is the title of a bulletin by Dr. Lawrence R. Hafstad of General Motors. The growth of research and science (since the beginning of the industrial revolution) is discussed. Problems of the industrial research scene such as patents and patent protection, the relative proportion of long range and short range activities, and the interaction between technology (the process of discovery, invention, development, and production) and society itself are touched on. •

SIMONDS
ABRASIVE CO.

Mounted Wheels for IMPROVED grinding



Here are some reasons why these wheels are YOUR best bet for better grinding.

Accurately contoured wheel face assures top cutting efficiency.

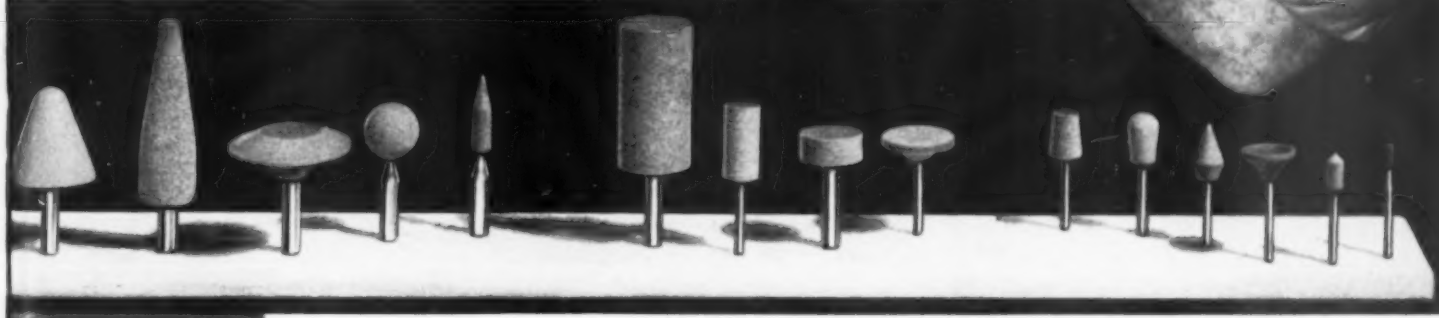
Wheel strongly bonded to steel mandrel with special cement.

Mandrel pressure-inserted in most shapes for extra strong binding of wheel to steel.

Large wheels can be chucked in any position.

Each wheel carefully tested for concentricity and true running.

Available in all shapes and sizes.



INDUSTRIAL DISTRIBUTORS — RIGHT HAND OF PRODUCTION

Put these dependable grinding tools on *your* machines for superior results in stock removal, internal grinding, slotting, notching, cleaning-up, chamfering, burring or grinding in hard-to-reach places. Write for bulletin ESA-67.

CALL YOUR SIMONDS DISTRIBUTOR

Proven products

Dependable know-how

Quick supply

SIMONDS ABRASIVE COMPANY

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Division of Simonds Saw and Steel Co.

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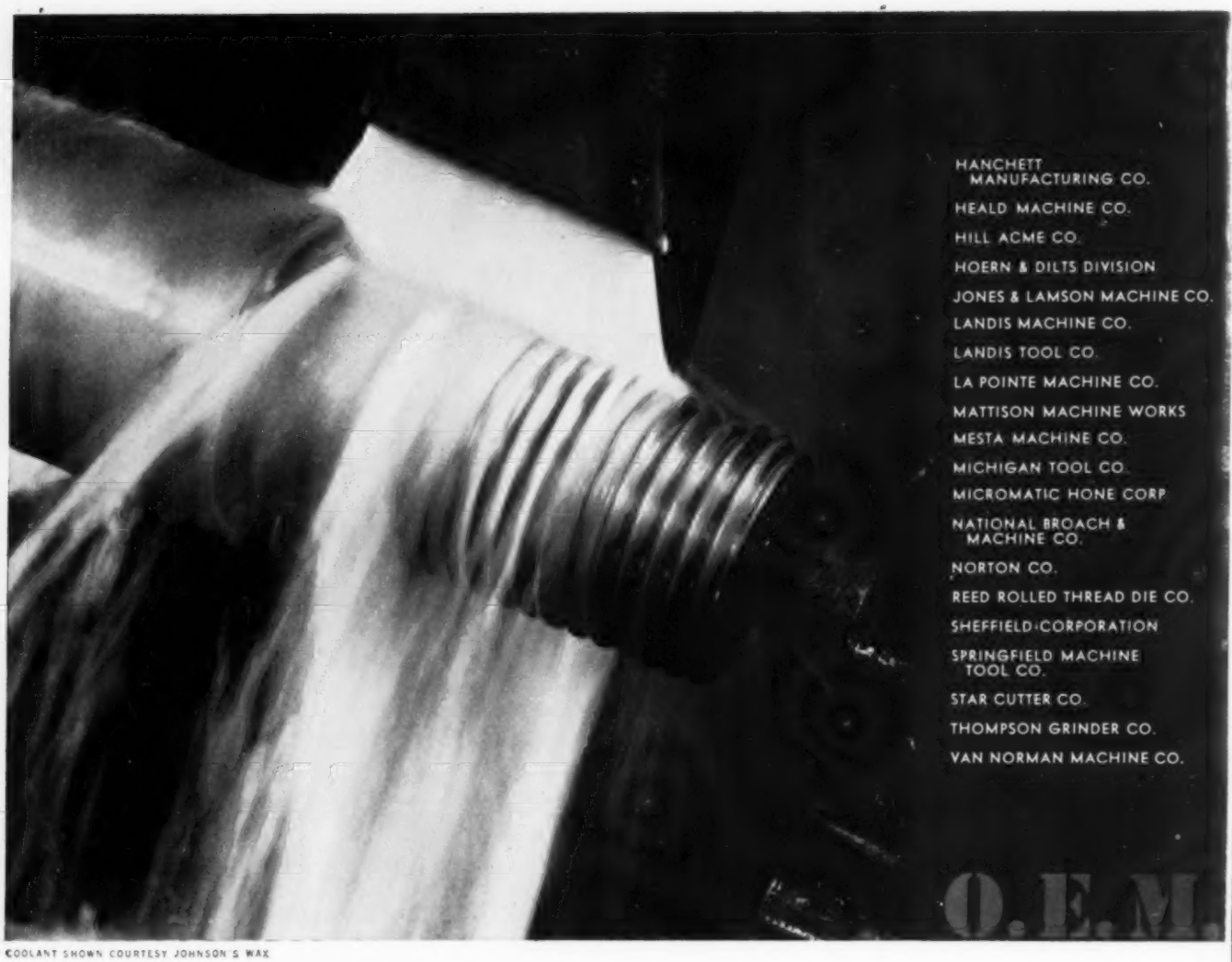

COOLANT SHOWN COURTESY JOHNSON'S WAX

Machine tool buyers are more satisfied when machines perform as intended!

BARNESDRIL COOLANT CLEANING
assures original operating conditions!

When machines are designed and built to perform specific operations within close tolerances, customers are not satisfied unless these machines *continuously* produce the same results. Machine tool buyers are assured of continuous satisfactory performance when OEM builders supply BarnesdriL Coolant Conditioning on their machine tools. Many original equipment manufacturers recognize this fact as an important selling point and are users of BarnesdriL equipment as indicated on the adjoining list.

BarnesdriL assumes responsibility for proper operation of its Coolant Cleaning Equipment installed as original equipment on machine tools, and our regular service policy applies at no cost to the builder.

Call for a BarnesdriL Sales Engineer today and discuss the customer benefits of providing Coolant Conditioning on your machine tools.

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A 3M Case History Report

GRINDING PRODUCTION INCREASED 50% WITH "WETORDRY" BELTS

MANUFACTURER: Dictaphone Corporation

ADDRESS: Bridgeport, Conn.

PRODUCTS MANUFACTURED: Dictating Equipment

3M ABRASIVE USED: "WETORDRY" Tri-M-ite Cloth Belts

HOW 3M ABRASIVES ARE USED: Sizing bottom side of cast magnesium main frame of Dictaphone dictating machine, to remove burrs and casting imperfections for true flatness.

OPERATIONAL DATA ON 3M METHOD: Grit 60 "Wetordry Tri-M-ite" Cloth Belt is used on an Engleberg Huller BG8 Grinder. Constant flow of water is maintained over grind surface of the magnesium.

OPERATIONAL DATA ON PREVIOUS METHOD: A competitive brand of abrasive belt was used for the same operation.

PROVEN ADVANTAGES OF 3M METHOD: Production increased 50% per belt—from 900 pieces with the former belt to 1,350 pieces per 3M Belt with no loss in time or decrease in quality.

OTHER 3M ABRASIVE PRODUCTS NOW IN USE: "Three-M-ite Resinite" Cloth Belts are used to finish aluminum trim bands; "Tri-M-ite" Cloth "PG" Wheel used to pre-polish dictating belt mandrel ends.

WANT MORE INFORMATION? Send for free manual, "3M Method of Belt Grinding and Finishing." Just write on your letterhead to 3M Co., St. Paul 6, Minn., Dept. IU-48.

"Wetordry", "Tri-M-ite", "Resinite", and "Three-M-ite" are registered trademarks of 3M Co., St. Paul 6, Minn.
Export: 99 Park Ave., New York. Canada: London, Ontario

3M Coated Abrasives
"WETORDRY" CLOTH BELTS

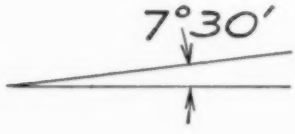
MINNESOTA MINING AND MANUFACTURING COMPANY
...WHERE RESEARCH IS THE KEY TO TOMORROW
3M COMPANY

This is a knock-out cavity bushing.

It is used in plastic injection molding.

It is manufactured by *FASTEX*,

Division of Illinois Tool Works, Des Plaines, Illinois.

It has a 

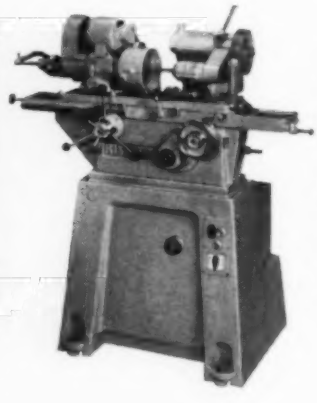
internal taper.

It is ground from hardened tool steel, 58-60 Rockwell C

The tolerances must be held to 0.0002"

The grinder on which this bushing and all its cousins are made is a

RIVETT
MODEL 84



Model 84
An internal specialist with external ability. Mounts interchangeable wheelheads for internal and external spindles. Capacities are 3" diameters, depth 4". Collets and step chucks mount directly in lathe-type spindle.

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DEPT. GF 4, BRIGHTON 35, BOSTON, MASS.

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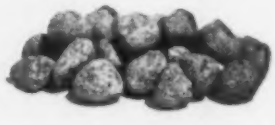

ALUNDUM* TUMBLEX* "A" Abrasive. For general barrel finishing. Removes flash, scale, tool marks and burrs, while forming radii and finishes to required micro-inches. Seventeen sizes.

ALUNDUM TUMBLEX "T" Abrasive. Bonded, triangular and fast-cutting for special shaped parts. They won't wedge in work slots or holes. Four sizes.

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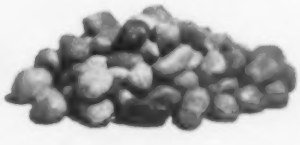

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If you're still finishing metal parts the long, hard way, now's the ideal time to find the fastest, most effective barrel finishing equipment, methods and abrasives.

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Making better products... to make your products better

NORTON PRODUCTS
Abrasives • Grinding Wheels • Grinding Machines
Refractories
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Coated Abrasives • Sharpening Stones
Pressure-Sensitive Tapes

How Fred Lee

Stan Bozek, Abrasive and Methods Engineer at Marlin-Rockwell Corp., Plainville, Conn., discusses new form grinding technique for ball bearing races with Fred Lee, Manager of Bay State's district office in Bristol, Conn.

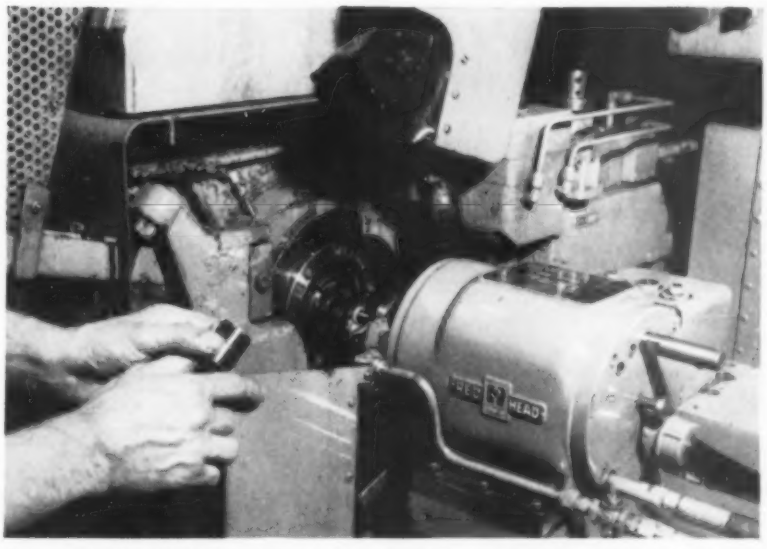
e helped revolutionize the grinding of bearing races

Ball bearings used in missile guidance systems and other highly critical applications have to have super-accurate races . . . but cost is vitally important, too. That's why Marlin-Rockwell Corp., of Plainville, Conn., was one of the first bearing manufacturers to switch from the oscillating rubber wheel grinding technique to form grinding.

Bay State's Fred Lee, recognized as one of the country's leading authorities on bearing grinding, was called in to discuss the problem with Marlin-Rockwell engineers. After exhaustive study, he specified semi-friable, fine grit, medium grade vitrified wheels that varied in size from ½" to 20" diameter.

Result: 50% closer confinement of race curvature, 100% improvement in roundness and consistent uniformity in multiple production runs. General foreman John Gworek, veteran of 30 years of precision bearing grinding, says flatly: "It's the *only* way to grind them."

Like Fred Lee, your own Bay State representative may be best known as an expert in a particular type of grinding but his general knowledge of grinding techniques is both wide and deep. **Better grinding at lower cost . . . that is his business.**



Form grinding 2 ball races at the same time on water pump bearings with Bay State vitrified wheel, diamond dressed only every sixth piece, on Heald 1701 Form Grinder.

Rough form grinding O.D. contour of inner races with 20" diam. Bay State vitrified wheel (Crush formed) on Cincinnati Microcentric Grinder.

BAY STATE WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

Do the **BIG** jobs . . . and the small ones too on a **BRYANT**

No matter what your internal grinding problem may be, it can be solved effectively with a Bryant Internal Grinder.

Bryant's great variety of manual, semi-automatic and automatic grinders is your assurance of a machine that is tailored to meet your production requirements.

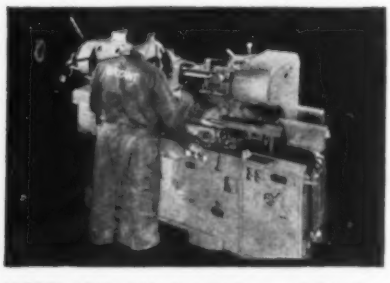
Investigate how Bryant's engineering services can help you attain higher production at lower operating costs.

MODEL 1460 Hydraulically operated. Chuck swing of 60", total wheelslide stroke of 21"; maximum grinding stroke of 16".

THE "CENTALIGN", completely new in concept and design, is ideal for the long run, high production grinding of straight bores, tapers and bearing raceways. Maximum swing, 10", grinding stroke, 1".

MODEL 1109 A precision internal grinder, suitable for covering the range of smaller bore sizes. Total swing of 9"; maximum grinding stroke of 3½".

MODEL 1116 Tops for both toolroom and general production work. Total chuck swing 16"; maximum grinding stroke 8".



MODEL 1316-J Hydraulic Internal Grinder. For combined bore and face grinding. Two wheelheads on a single wheelslide provide exceptional speed, accuracy and versatility. Maximum swing, 16", maximum grinding stroke, 8".

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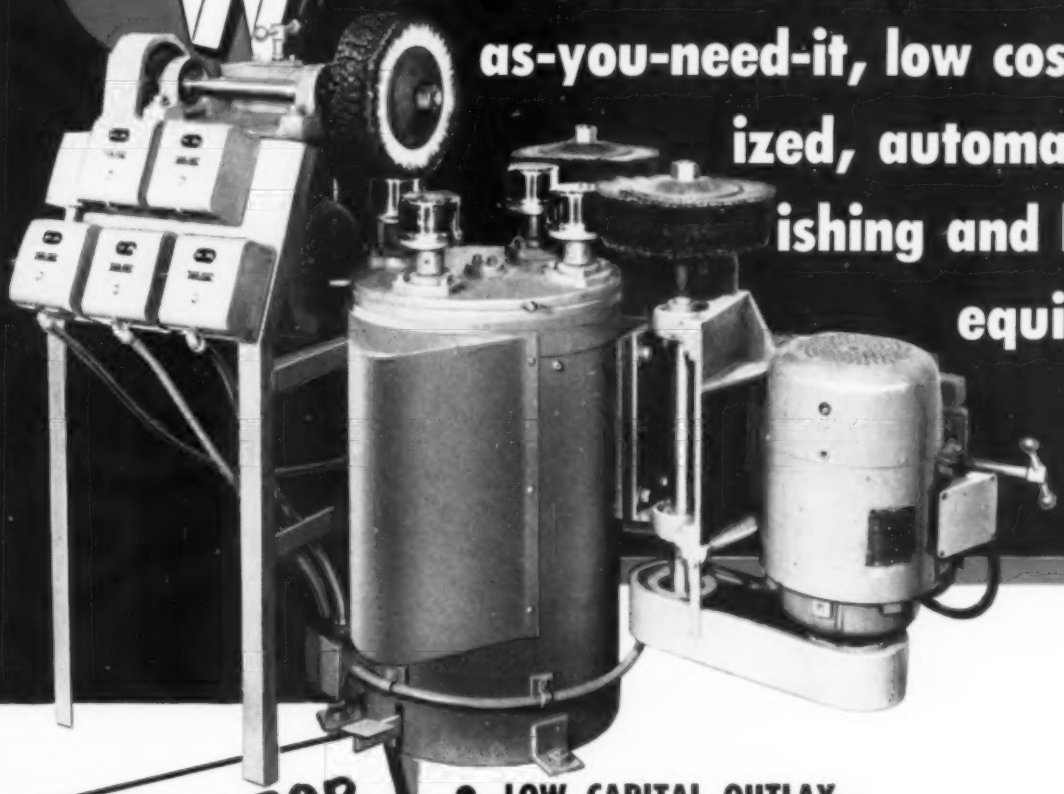
a practical, new idea in add-as-you-need-it, low cost, unitized, automatic polishing and buffing equipment!



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- EXPANDS INEXPENSIVELY TO YOUR NEEDS.
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Murray-Way's years of specialized experience in automatic polishing and buffing equipment are at your service. The Junior Automatic is only one item in our line of standardized equipment for specialized applications. We invite your inquiries and special equipment problems.

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Available with basic equipment at a fraction of the cost of conventional automatic or semi-automatic buffing and polishing machines, the Junior Automatic can be equipped with standardized additional units, as-you-need-it, to handle practically any job in the place.

Adjustable heads available with vertical, horizontal and angle wheels or abrasive belts. Adjustable cycle and dwell. Automatic wheel lift-off and other features usually available only on bulky, expensive automatics.

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in number and in total carat weight, than were available as gem diamonds in the U. S.

...mined or man-made...

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This leadership, firmly established by producing the finest cutting diamond wheels, began when only natural diamonds, known as bort, were available for industrial use. In 1930, Norton was first in this country to make, and in 1934 first to sell, successfully developed bonded diamond wheels.

And today, similar pioneering by Norton is assured in the processing of grinding wheels using diamonds, mined or man-made. That is why Norton diamond wheels continue to live up to their long-established reputations for exceptional value.

And that is why they are recognized as the *Crown Jewels* of industry — not only for familiar grinding operations on carbides, ceramics, stone and glass, but for solving the grinding problems of new metals, alloys and materials. Your Norton Abrasive Engineer or Norton Distributor will be glad to give you prompt service and additional facts about diamond wheels. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

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Puts the bite on "Carbide"

Under actual shop conditions . . . *in a single pass* . . . the new Reid 618 Electrolytic Grinder has removed up to .090 from K1 carbide stock with a ½" wheel. The Reid Electrolytic has performed equally well on hardened steels and heat sensitive materials. Charts below show conservative ratings of stock removal under production conditions.

An "Anocut" 300 ampere unit furnished electrolytic power with the coolant used as a means of furnishing electrolytic salts and water to the wheel. Special spindle design, convenient controls and a 20 to 1 variable speed DC drive for the table, round out this highly versatile grinder. The grinding "finish" is burrless . . . and, in fact, eliminates much of the metallurgical damage caused by normal grinders.

For complete details write today.

REID 6 x 18
Electrolytic Surface Grinder
Readings Utilizing Metal
Bonded Diamond Wheel
7" Dia. ½" Width

TABLE FEED	DEPTH OF CUT	D.C. AMP. DRAW	SOURCE VOLTAGE	GRINDING VOLTAGE	INC. VOLTAGE SETTING	SUPP. SPARK SETTING	SPINDLE NO LOAD	SPINDLE LOAD	MATERIAL	VOLUMETRIC REMOVAL
¼"/MIN.	.040	210	12	12	55	55	2.3	3.7	KENAMETAL K1 CARBIDE	.015 CU. IN./MIN.
1½"/MIN.	.070	170	12	12	55	55	2.3	3.7		.015 CU. IN./MIN.
3"/MIN.	.010	200	9	9	55	55	2.3	4.0		.015 CU. IN./MIN.
1"/MIN.	.040	280	10	9	50	50	2.3	3.5	370 CARBOLOY	.020 CU. IN./MIN.
2"/MIN.	.020	230	10	9	50	50	2.3	3.6		.020 CU. IN./MIN.
4"/MIN.	.010	200	9	9	50	50	2.3	4.0		.020 CU. IN./MIN.
1"/20 SEC.	.020	250	11	10	86	77	2.3	3.0	CARPENTER STENTOR	.030 CU. IN./MIN.
1"/40 SEC.	.040	300	13	12	97	77	2.3	3.2	M.I.S. ROCKWELL 53C	.030 CU. IN./MIN.

Manufacturers of precision surface grinders for production and toolroom needs

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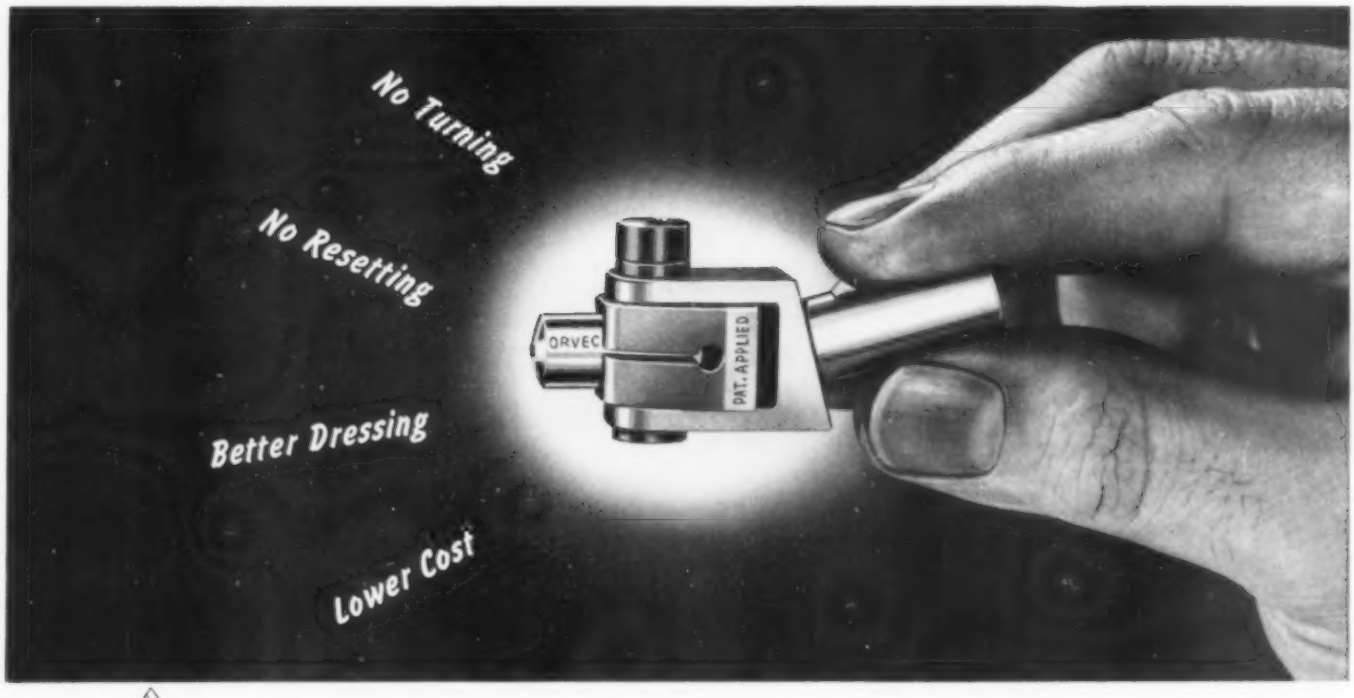
The Greatest Advancement in Diamond Dressing Tools in 40 Years!



ORVEC WITH NEW ORIENTED VECTOR PRINCIPLE MAKES CONVENTIONAL DIAMOND TOOLS OBSOLETE!

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ORVEC—the oriented vector diamond tool—is based on a new scientific principle of diamond hardness orientation combined with an exclusive setting process. The result is a superior diamond tool that can be used up completely *without ever rotating* or *resetting*. Each ORVEC tool operates with the same efficiency as another, providing identical performance during its long life. It dresses and trues evenly, uniformly, "time after time" with *dependable consistency . . . without variation!*

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A slab of scientifically determined cross-section is sawed from a high quality diamond. The slab is then accurately oriented by X-ray diffraction and is precisely transferred to the tool nib by fixtures eliminating unreliable hand operations. These foolproof techniques orient the slab to its optimum hardness vector (wear resistance) assuring maximum tool life; practically eliminates fading, gives micro finish of parts and more pieces between dressings.

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giving full detailed information on this remarkable Diamond Tool. Learn about Diamond Vector Orientation and what it can mean to you in operating efficiency. See the many exclusive advantages only ORVEC can offer.

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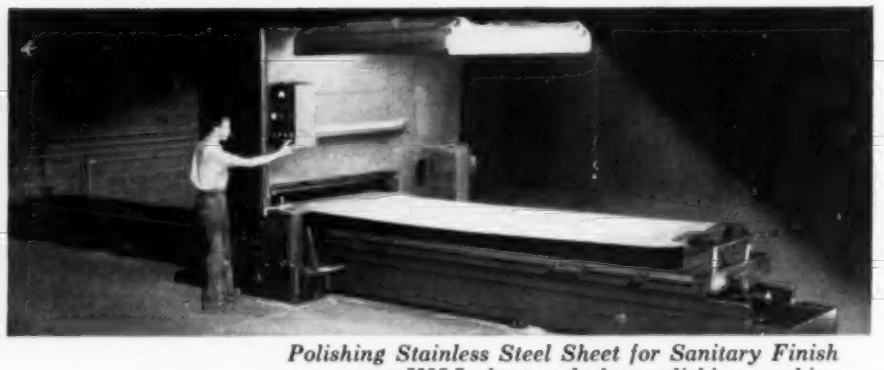
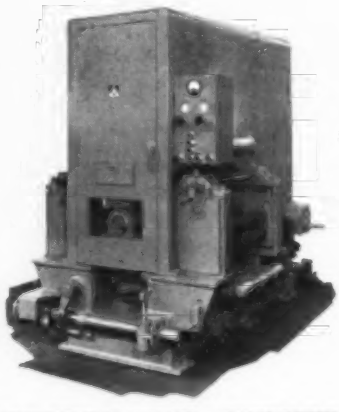


Polishing Stainless Steel Sheet for Sanitary Finish on a HILL sheet and plate polishing machine



HILL Pinch-Roll type machine for polishing strip on multiple units

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Editor's Page

There Is No Better Time!

Sales of new equipment have been slow this year. But, isn't it also true that, there isn't a plant in operation which doesn't need new equipment? Equipment ten, twenty and even thirty years old is presently in full use. You're right, this equipment still produces parts but what about the maintenance they require and the amount of scrap they produce? What about the new developments of standard equipment and processes? New and old machines alike are costing you money because they have been obsoleted by recent developments. Accuracies and finishes considered impractical only a year or two ago are now obtained with ease by present day equipment and processes. These are some of the reasons why there is no better time than now to buy new equipment.

Let's take a closer look at the first statement, "Sales of new equipment have been slow." This has its benefits to you, the buyer. We don't have to go back too far to remember when delivery of new equipment was a very big factor in placing an order. Replacement and expansion plans had to be finalized years ahead of completion dates. During the elapsed time new developments made the purchased equipment obsolete. Now, deliveries are much shorter!

Still another benefit is service. It is again easy to remember when machines were down in need of repair and a service man couldn't be bought for any price. The reason for this was that a large number of service men were needed to set-up new machines. This is not the case now!

During the period of heavy sales, builders, like all other concerns caught in the rush, shorten their run-in, inspection and most any operation which would decrease the delivery time. Parts were borrowed from one order to complete another. The word "rush" was standard and "very rush" became an often-used exception. It is difficult, to say the least, to build precision equipment under these conditions.

The box score, therefore, reads like this: We all need new equipment. Deliveries are short. Service is faster and more thorough. Greater care can be taken in the production of equipment. And prices are relatively lower. There is no better time to buy!

M. M. Patterson

MANAGING EDITOR

Grinding and Finishing

APRIL 1958

Loading of the chucks is performed automatically by the machine from a chute. Hopper feeds are planned for the future.

Internal Grinding

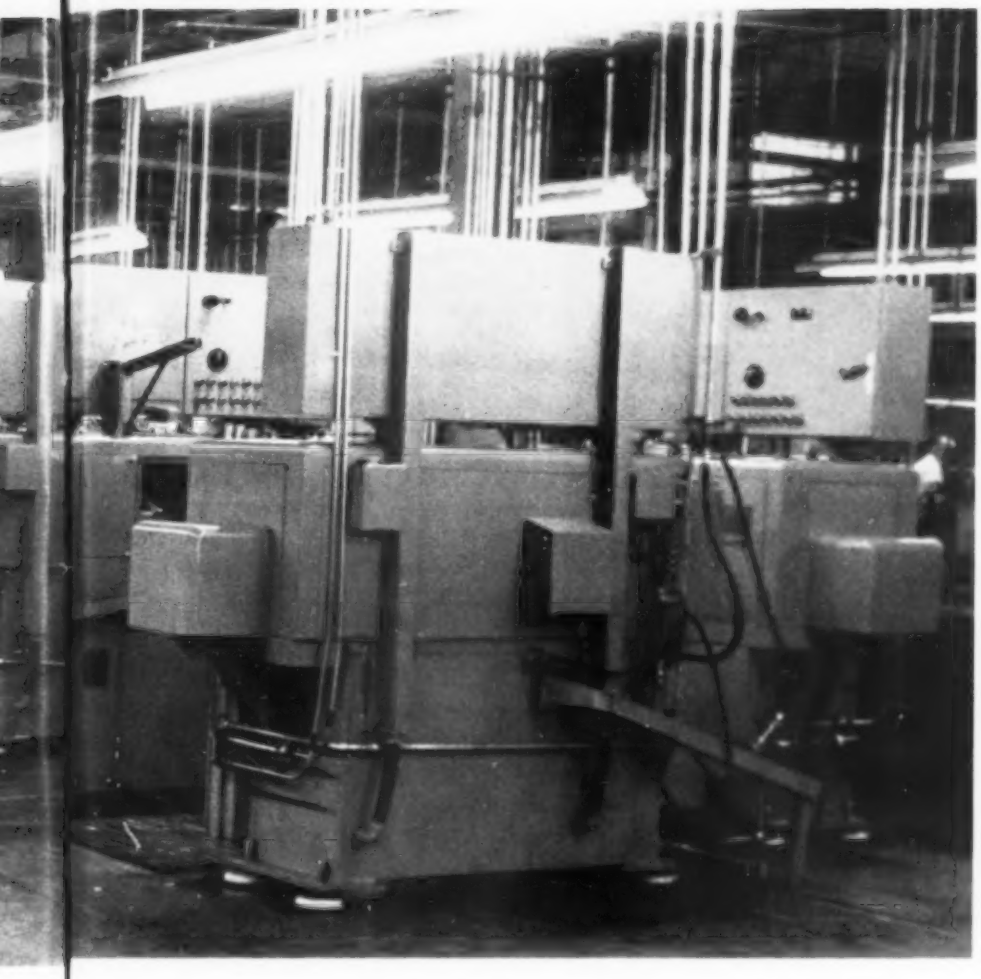
By **James B. Pond**
Staff Writer
an interview with Raymond Sawtell, Foreman of Internal Grinding at McGill Mfg. Co., Valparaiso, Indiana

• Grinding the inner races of roller bearings on a production basis is not the easiest internal grinding operation particularly for a line of custom roller bearings like those made by the McGill Mfg. Co., Inc. of Valparaiso, Indiana.

McGill's line of custom bearings consists of a standard line of designs, but production is keyed to customer order rather than to stock. Special design bearings are also processed in their product line and they have to be processed along with the standard designs.

Two designs of roller bearings of unusual interest are McGill's MULTIROL and GUIDEROL® roller bearings. The MULTIROL design has roller retaining end shoulders built integral with the outer ring. The GUIDEROL bearing has a built-in center guide rail. Both of these designs necessitate a jump up-to-feed position with closely controlled wheel oscillation to attain the desired finish, concentricity and straightness or parallelism of the races.

Initially the 52100 steel used for the bearing races arrives at the plant as tubing and goes to National Acme multiple spindle automatic screw machines. The outer races are drilled and formed complete before going to secondary operations. Slotting, tapping and radial drilling operations are performed during the secondary operations where these operations are required.



Eight Bryant Centalign grinding machines doing the heavy internal grinding on outer races of McGill bearings.

ng at McGill

Heat treating follows secondary and is done in through feed furnaces. After heat treatment, the parts are sent to the external grinding department where they are ground on Cincinnati Centerless Grinders. A Hanchett double disc grinder and several Blanchard rotary surface grinders perform the face grinding tasks.

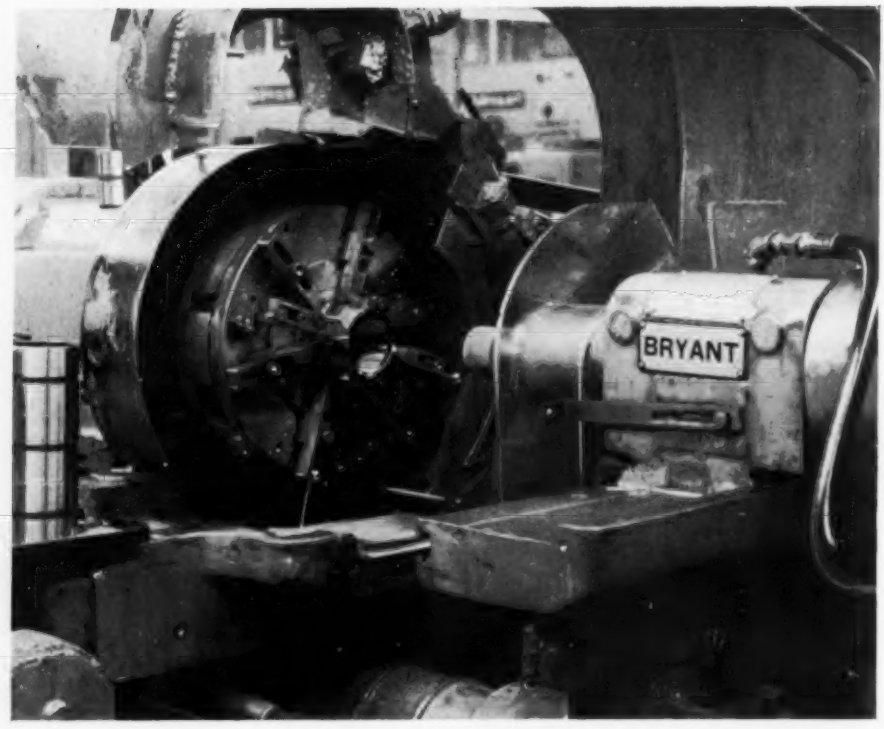
For the internal grinding operations, on Bryant Centaligns, concentricity of the outer races depends upon the centerless grinders. Most tolerances range around .0002″ with a 3-point gauge being used to check roundness of the parts. Roundness must be held to within .00025″ on most of the firm's roller bearings.

A 10 micro-inch finish for roller races is attained by the grinding wheels, sufficient for the races of roller bearings. Finish on the rollers however is considerably lower.

Lot sizes range from 5 pieces to 50,000 pieces, with the majority of the runs being in the hundreds of pieces. Biggest problem for the department appeared to be in stock removal variations.

The amount of stock removal during grinding ranges between .010″ and .028″ for different race diameters. Feed on the internal grinders is continuous and at a rate that is as fast as is practical. The feed rate and cycle time of the machines are established by the process engineers who base their recommendations on past experience with cubic inch of stock removed. From the time that the first job is set up on an internal grinder, experiments are made to find the maximum or shortest time cycle consistent with good wheel wear,

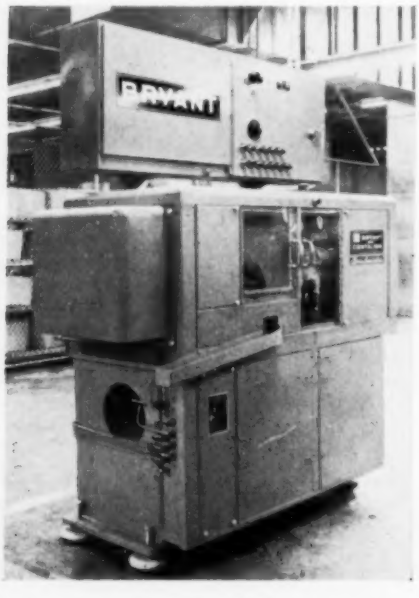
Bearings are automatically discharged from the machine and have to pass 100% inspection.



Diaphragm chucks, used for internal grinding shown here, are built by McGill. The six jaws are adjustable to self-center the parts for each setup.

desired finish and straightness of bearing surfaces. These results are tabulated and kept up to date with each job as it is run through the department. Averages can then be determined for future estimates and recommendations.

We watched the operators at work and noted that they operated two internal grinders and have 100% inspection of the parts coming out of the machines. Loading the chucks is done automatically by the machine from a chute. Hopper feeds are planned for some time in the future and possibly some transfer chutes will be used where they are practical for their type of operation.



One of the Bryant Centalign internal grinding machines using high frequency spindles ranging from 10,000 rpm to 30,00 rpm.

Diaphragm chucks are used throughout the department. Most of the chucks were built by McGill for their own use. One model chuck covers diameters ranging from ½" O.D. to 3" O.D. The other model ranges from 3" to 6½" O.D. The design of the chucks uses 6 jaws which are adjustable to self-center the parts for each set-up. End clamping fingers are also incorporated to firmly grasp two or more races for internal grinding. Air or hydraulic cylinders actuated the diaphragm chucks, the choice depending upon the installation of the machines. On a few of the hand operated machines, the chucking is also actuated mechanically, by hand. As with many other chuck designs, the chuck jaws are ground in position by the grinding wheel to assure concentricity.

Following good grinding practice, the department uses the largest diameter wheel practical for the I.D. being ground. On the Multirol design, where there are roller retaining shoulders to clear, they use a ¾" diameter wheel on a 1" I.D. hold. When the wheel wears to about a ½" it is replaced. Most of the jobs on the 52100 steel are ground with a Norton A901 M6V wheel. A 70 grit wheel is used on larger diameter races.

Spindle speeds are determined by the spindles selected for the different machines. The Centaligns use high frequency spindles ranging from 10,000 rpm to 30,000 rpm. In addition to these machines, the department uses 21,000 to 60,000 rpm high frequency spindles on their older Bryants and Healds.

These spindles are made by Bryant. We asked about them and found that their centralized convertor system is used to convert 60 cycle current to higher frequencies for the different spindle speeds. For example: the convertors step up the 60 cycles per second current to 1,000 cycles per second for the 60,000 rpm spindles. The spindle motor rotor and quill shaft are integral. Experience has shown that since the higher spindle speeds give a much better finish it is therefore to the company's advantage to have the proper spindle speeds readily available.

Centralized convertor system is used to convert 60 cycle current to higher frequencies needed for the different spindle speeds.

Internal grinding experience at this shop has worked well with the Industrial Filtration Co. centralized coolant system. Using Sun Emulsified Cutting Oil, they have found that during the winter a ratio of 40:1 works best. During the summer they use a 20:1 ratio. Although the coolant system is constantly filtered, the cutting fluid is changed; once for the winter and several times

during the summer when it is believed that atmospheric conditions affect the cutting fluid. How do they know when to change? Ray Sawtell, foreman of internal grinding, said, "With the help of our Plant Engineer we watch the cutting fluids for wheel break down and loading. Fluids are changed as frequently as needed."

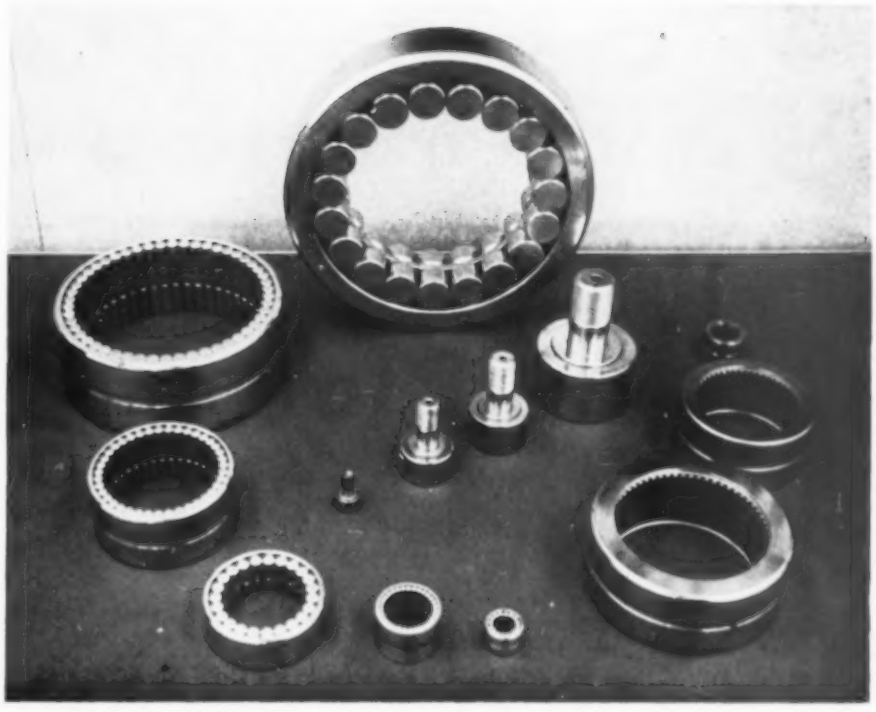
Vibration is carefully watched in the internal grinding department. Each machine is mounted on vibration dampening mounts. We noted that quill lengths were all kept as short as is practical and asked whether they had used powdered metal and carbide quills because of their vibrations dampening properties. They had tried them but did not feel secure with them because those quill materials are also brittle and the internal grinding requirements in the department were rugged with the heavy infeeds used. Most of the quills used are made from 52100 steel and are not heat

Centralized coolant system by the Industrial Filtration Co. constantly filters the coolant and has reduced coolant changes to several times in the summer and only once in winter.

treated except in the smaller size, which are brought up to 40 to 45 Rc through heat treatment.

One of the reasons behind the choice of the Bryant Centalign Internal Grinding machines was the rigidity of the machine design (see story of wheelslide construction in August G & F). This rigidity has been particularly outstanding on the larger diameter races of 2" or more and, in the smaller bearing sizes, on heavy in-feed grinding which is typical of McGill's operations.

An increase in machine horsepower had to be made. Normally the machine is furnished with a 5 horsepower motor for the wheel



Production at McGill is keyed to customer order rather than to stock. The bearings above show the wide range which are run in varying lot sizes.

drive. With the heavy infeeds used, McGill ordered the machines equipped with 12 horsepower wheel drive motors and these have worked out very well in operation.

Cycling of the machines also was important for this installation. On one type of bearing race, for the Multirol bearings, the wheel must clear a ⅜" (maximum) integral retaining end shoulder and then jump to feed position to grind the race surface. On the Guiderol design races, the built-in center guide rail is .020" high, which dictated the choice of two grinding wheels to straddle the rail. This operation is usually performed on earlier model Bryant and Heald internal grinders. Horsepower is also upped here, but from 5 hp to 10 hp. In order to eliminate wheel marks, the spindle is oscillated .060" for I.D. grinding.

It was interesting to note that the hydraulic system for the Centaligns was also centralized, being alongside the converters previously mentioned.

At present eight Bryant Centalign internal grinding machines are operating in one line, doing the heavy internal grinding on the outer races.

Mr. Sawtell reports that they have attained an estimated average saving of 20% with the new machines, showing once again the savings possible when new equipment, of whatever manufacturer, replaces older machines. This average was based on some jobs saving over 50% in production time while on other jobs, on the smaller diameters, the savings have not been as pronounced. This estimate is based on a three month period since the first six machines arrived. Several more have been ordered, with two new ones arriving while we were at the plant. Sawtell said that the savings will probably be higher over a longer period of time.

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McGill uses a central hydraulic system for the centalign line.

Cleaning of Grinding and Finishing Coolants

Accepted Methods of Cleaning Coolant

Part II

By **Arthur L. Wilson**
Filtration Engineer
Barnes Drill Co.

Practically all coolant cleaning equipment manufactured or built today can fall in one of the following categories:

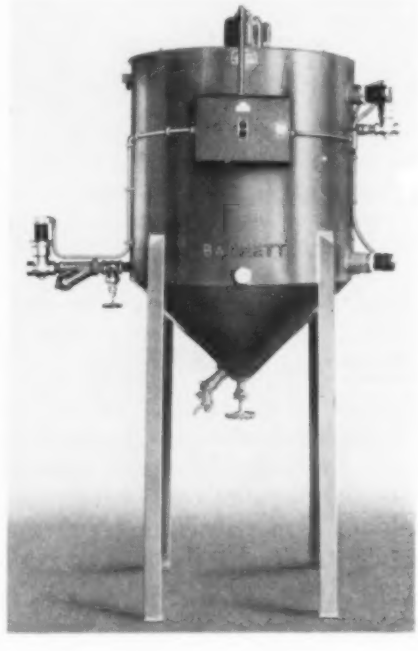
1. Settling
2. Straining
3. Centrifuging (Accelerated Settling)
4. Magnetic Separation
5. Positive Filtering
6. Flotation
7. Combinations of several of the aforementioned methods.

Taking each of these methods individually, you will note that they are differentiated by some distinct features that would make selection of one method a mistake while the choice of another method would be satisfactory.

Settling. Probably the most elementary form of cleaning is the settling tank. This is used where either a very great volume of coolant is prevalent, giving you a high coolant retention time, or baffles have been added in the tank to reduce the coolant turbulence. Settling tanks are effective only if relatively large quantities of coolant are used and a quiescent state may be achieved. Settling tanks are practical only when the ratio between the quantity of coolant flowing onto the work to the volume of the coolant in the tank is very great. (A minimum on heavy stock removal jobs should be 1:6.) Successful attempts to make this type of device fully automatic have been made by the introduction of motor flight or drag type conveyors. On grinding operations where a large amount of friable material is encountered and where the grinding swarf load is very high, you may find this drag type coolant tank to be satisfactory, but this piece of equipment is then used only as a measure of cutting maintenance costs due to tank clean-outs, not as a means to give truly, clean coolant. This type of a device is more satisfactory where the swarf particle sizes are very large and where space permits the installation of this type of equipment.

Straining is a means of cleaning coolant through the introduction of a perforated metal plate or a woven wire screen between the coolant discharge from the machine tool and the coolant reservoir. With this type of a device, you are assured of the elimination of particles larger than the openings in the medium you have chosen to remove the foreign particles. Usually, this type of equipment serves only as a protective device to coolant pumps and small coolant headers by holding back the large particles. These devices are usually much more satisfactory on machine tools generating very large chips than they are on equipment generating small ones, such as grinders. Strainers must not be considered in the same light as filters because strainers are not filters, the difference being that strainers usually have a regulated surface area with the openings being readily visible and of a predetermined geometric pattern and size. This arrangement does not exist in true filters. The interstices of a good filter are usually developed by a random lay-down of certain elements that contribute to make up the filtering medium. These elements of the filtering medium may be either the material of which the filter is constructed, the "cake" deposited in the coolant cleaning operation or some type of "filter aid" which forms the filter bed.

Centrifuging is the principle of applying a mechanical device utilizing the centrifugal force gener-



Settling and sterilizing is performed simultaneously with this equipment. The coolant is held for 20 minutes during which the coolant is heated and the sludge is allowed to settle. The sludge is then decanted off at the bottom. (Leon J. Barrett Co.)

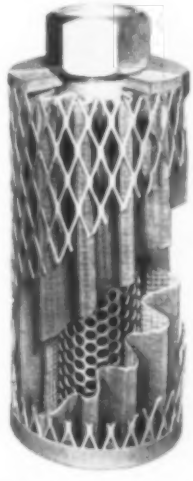
ated by a rotating body as a means of accelerating the gravitational force which may act upon a particle being rotated. Centrifuges have long been used in the handling of liquids and recently, there have been several of these devices made available for use in the coolant cleaning equipment applications on grinding and finishing machines. The units that are available today have proved to be satisfactory on applications where the solid's content of the coolant has not been high and where the flow rate from the machine tool is not large. Particularly, these devices have found application on honing machines and gear grinding machines because in the first case, the contaminant load is usually light and in the second case, the swarf is of a mossy nature that forms a felt-like ring inside the bowl of the centrifuge making the device easy to clean. There is a foreign centrifuge that is available today, a foreign made centrifuge that is self-cleaning by the method of a rapid reversal of the rotating member which is inverted from the position that you usually find the bowls of centrifuges. In the majority of cases, the centrifuges that are used in the coolant cleaning field are cleaned manually and are somewhat limited in their capacity to handle the wide range of flow rates that are encountered in the field.

Centrifuges have also been used successfully on applications where liquids of two densities must be separated, especially where tramp water has a tendency to get into coolants of the heavier oil type. These devices, when applied in the aforementioned manner, are usually installed on by-pass systems and do a good job in this application. Centrifuges have a wide acceptance in the cleaning of engine run in oils and other cleaning applications where they have been made a part of batch type cleaning systems. It is very important that when you contemplate the application of a centrifuge to a coolant cleaning problem, that you get the assistance of the manufacturer of the equipment.

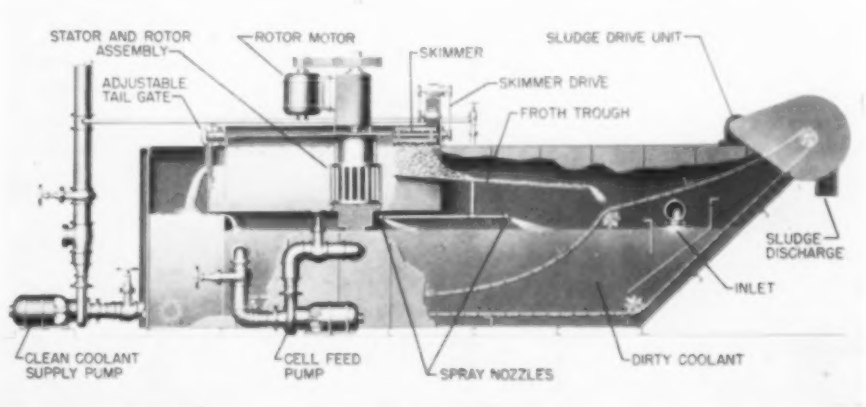
Magnetic Separation has long been a standard method of cleaning coolant and at the present time, there are available in the United States, four (4) types of Automatic Magnetic Coolant Separators. The more conventional design of this piece of equipment is the one having sealed magnetic drum immersed in the coolant channel in such a way that the magnetic attraction between the ferrous particles in the coolant and the magnetic drum will be constantly introduced through the means of rotation of the drum.

Settling method of coolant cleaning is performed in equipment like this controlled flow settling tank with drag conveyor. This method should be used when large quantities of coolant are employed and the swarf particle size is large. (Commercial Filters Corporation)

Strainer Type showing simplicity of construction. These strainers are usually used as a protective device for coolant pumps. (Capital Engineering Company)

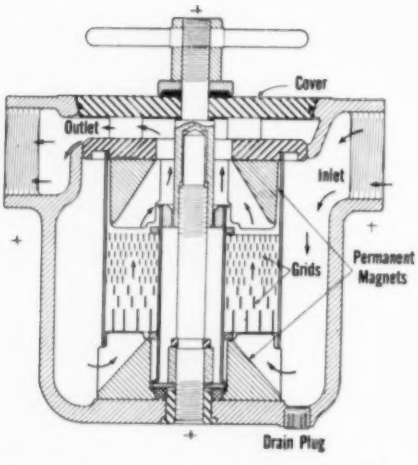


Strainer Type showing the use of both metal plate and woven wire screen. (Marvel Engineering Company)

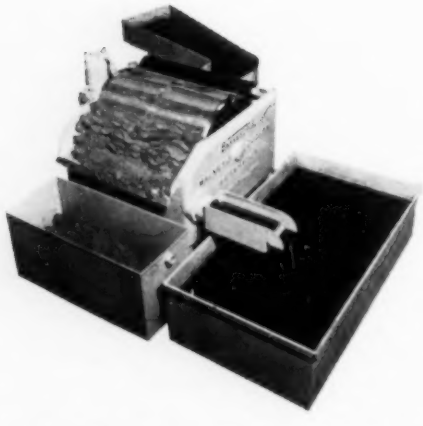


Flotation method shown here agitates the coolant to form a foam. Fine particles cling to the bubbles and are skimmed off the surface. Heavy particles settle to the bottom where a drag conveyor removes them.

Centrifuging method of coolant cleaning is performed by this centrifuge. Proved very successful where amount of solids in the coolant is low. (De-Laval Separator Co.)



Magnetic Separation is performed by this magnetic filter. Coolant must flow through grids of triangular mesh openings from .5" down to .15" in width. The grids are magnetized by two permanent magnets. (S. G. Frantz Co.)



Magnetic Separation is provided by passing the coolant under a drum containing permanent magnets. Equipment will remove a limited amount of abrasive material through the brush-like action of the magnetic contaminant retained by the drum. (Barnes Drill Co.)

A scraper or doctor blade serves to sever the ferrous particle from the magnetic drum and a new magnetic surface is constantly introduced into the coolant.

One other magnetic separating device has been built utilizing magnets located underneath a flat, non-ferrous plate. A motor driven drag conveyor serves to remove the ferrous solids from this plate. In comparison of the two types of equipment on a capacity basis, the drum type separators usually require less space than the flat type, utilizing a drag conveyor.

Different magnetic materials appear in these magnetic separators. The most common magnetic material is Alnico V; however, Alnico II has been used in the design of one of these pieces of equipment where it was not practical to use Alnico V. Magnetic Separators will remove a limited amount of abrasive material through the brush-like action of a contaminant retained by the drum as the drum revolves in the coolant channel. These pieces of equipment are not meant to be filters. They do only one thing; they separate ferrous metals from liquids and for their purpose, they are highly satisfactory. It is only when these pieces of equipment are misapplied that they become troublesome.

Although this type of equipment can usually handle extremely large flow rates for the size and type of construction, it must be understood that the various elements that contribute to the selection of a piece of coolant cleaning equipment must be applied in the selection in the size of Magnetic Separators.

Using water as a standard of operation, and assuming that water has a viscosity of 30 SSU at 100° F, we must make certain that as we encounter problems where viscosities are higher than that of water, we must compensate for this increased viscosity by increasing the size of the Magnetic Separator. This is also true when you encounter metal finishing operations that produce a very fine swarf. For example, we cite a case where a honing machine having a coolant flow of 20 GPM of a 45 SSU at 100° F. coolant is in operation. Ordinarily, if this were a job using water, we would select a Magnetic Coolant Separator on the basis of a flow rate of 20 GPM. With honing, you will usually encounter a ferrous particle that is much smaller than that encountered on a heavy stock removal grinding operation; therefore, we must increase our Magnetic Separator size to compensate for the small mass of the ferrous particle. Likewise, we should increase the Magnetic Separator size because of the difference in the viscosity between water, which is used as a

FILTER MEDIA USED IN THE CONSTRUCTION OF VARIOUS TYPES OF FILTERS

Area Type	Wire Cloth (Metal Filter Cloth)		
	Porous Metal or Non-Metallic Material		
	Paper		
	Cloth Bags		
	Filter Presses		
	Web Type—Woven and Non-Woven Cloth		
Edge Type	Metallic Disks		
	Paper Disks		
	Spiral Metal Ribbon or Wire		
	Plastic Disks		
Depth Type	Absorbent	Asbestos	Cellulose
		Diatomaceous earth	Cotton Waste
		Mineral Wool	Paper
		Hair	Wound Yarn
		Flannel	Felt
	Adsorbent	Activated Clays	
		Silica Gel	
		Fuller's Earth	
		Activated Carbon	

basis from which to start the Magnetic Separator recommendations and an oil having a viscosity of 45 SSU at 100° F. You can not install Magnetic Separators merely on the basis of flow rate and expect to get the results that you would if you considered these other factors.

Another type of Magnetic Separator device that has found some use today in the cleaning of cutting oils and coolants has been the magnetic filter. This piece of equipment has been installed in two methods and the choice of the method would depend upon the purpose for which the filter was purchased. One method is to apply the filter on the intake side of a positive displacement pump and in this case, the magnetic filter is used as a protective device to eliminate the larger ferrous particles that may damage the components of the pump. The second method of installation has been to put this device on the discharge side of coolant pumps or near the entry of smaller coolant lines off a main header. This type of installation is used to protect the small coolant lines from plugging. The automatic screw machine has been one of the foremost applications that we know of. Magnetic filters have also found a place in the application on very small and light stock removal grinding machines such as those found in tool rooms or on very precise and fine grinding jobs that involve low production. In this case, the magnetic filter is installed between the coolant pump and the wheel head and is used only as a means of providing clean coolant at the work. No attempt should be made to use this device as a means of keeping a high volume of coolant clean and, therefore, should not be used as a means of keeping a coolant tank clean on large or high stock removal jobs.

These devices, although they are not self-cleaning, are some times used in coolant systems ahead of area type pressure filters of the cartridge type. The extraction of the ferrous material by this device greatly extends the cartridge life of the filter and thus lowers operating cost.

Filtering is by no means, a new method of cleaning liquids. History has traced this device back 4,000 years when Egyptians and Greeks used it to clean liquids.

Regardless of the various claims by manufacturers of unique methods in the various elements of design that you may encounter in the wide range of equipment available today, filtering has been categorized into three main classifications.

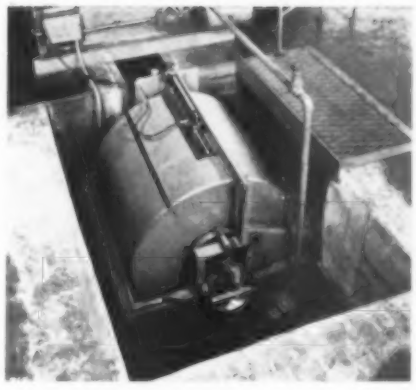
These are:

1. Area Types
2. Edge Types
3. Absorptive and Adsorptive Types or Depth Types

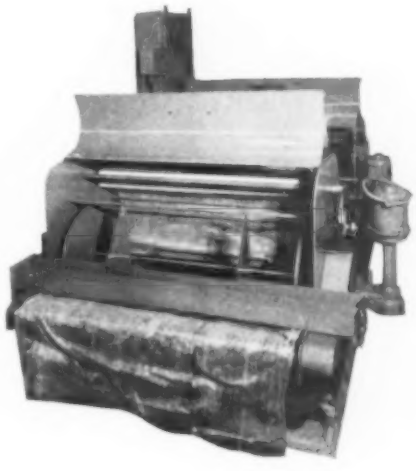
(See Table III for Grouping)

Area Type Filters are those made of wire cloth, or metallic or non-metallic porous materials, paper, non-woven fabrics and woven fabrics.

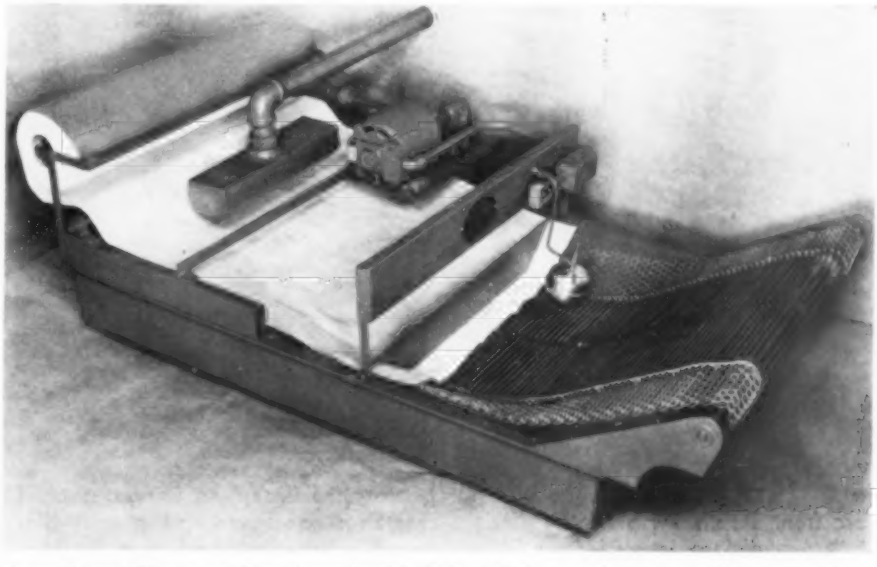
As the name implies, Area Type Filters depend only upon their surface area to retain the solids found in a liquid presented to the filter. A slight increase in efficiency is obtained through the cake that deposits on the surface of the filter; however, it is not the intent of this cake to determine the efficiency of a filter as may be the case in other types of filters. Usually, the Area Type Filters are the types that are found in lubricating oil systems of vehicles where a pleated paper element, in cartridge form, is found in the cartridge case. A second type of Area Filter which we frequently encounter is the filter incorporating a filtering medium



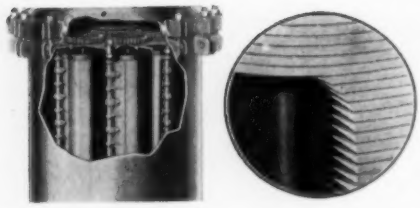
Area Type Filter. The drum of this equipment is formed from a woven wire screen which assures the removal of particles larger than the screen openings. (Murray Way Corp.)



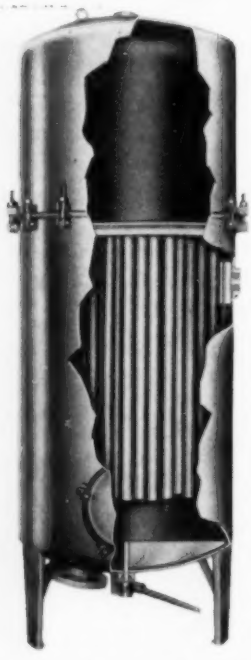
Area Type Filter using a filtering medium in roll form which feeds itself into area of filtration. (Barnes Drill Co.)



Area Type Filter showing the roll of fabric which may be selected for specific application. (Industrial Filtration Co.)



Edge Type Filter. Drums consisting of cores which are wire-wound at a predetermined opening are rotated so that the scrapers continuously remove accumulated sludge. (Bowser Inc.)



Diatomaceous Earth Filter. The earth is precoated on tubes. When it becomes loaded with sludge it is "blown down." (Commercial Filters Corp.)

Absorbent Depth Type Unit. Fuller's earth or cellulose is used as a filter medium in throwaway or repackable cartridges. (Hilliard Corp.)

which is in roll form and which feeds itself into the area of filtration as is required. There is some selection of filtering media which may be made for the specific application in question. On grinding and metal working applications where a higher degree of filtration than can be obtained by either settling or magnetic separation is required, this piece of equipment has found application. Usually, a 100 yard roll of this filter fabric will last from 4 to 6 weeks. A slight variation of this fabric filter would be found in the construction of a combination of Magnetic Separator and Fabric Filter. At this time, there are two distinct pieces of equipment of this type available for the user.

Edge Type Filters are those constructed of metallic plastic or paper discs, spirally wound metal or paper ribbons. These filters depend upon the spacing between the ribbon elements or discs to give you the required interstices for passage of the liquids and retention of particles. These filters are available with a variety of spacings. A common spacing range is between .031" and .003". Some of these Edge Type Filters have elements that may be cleaned without removing the element from the filter case. These manually cleaned units are built so that a revolving sweep which projects between the metallic discs will remove the foreign material from the interstices of the filtering medium when the sweep is rotated. The mechanism for rotating the sweep is usually a handle which is sealed and which projects through the top of the filter enclosure. Some of the sweeps are motor-driven and arranged for either timed operation or operation upon demand. A variation of the sweep type unit is the unit which incorporates a revolving brush. This spinning brush will rotate around the filtering medium, dislodging the dirt from the surface of the filtering medium. After dislodgment, the dirt falls into the lower section of the filter element enclosure.

These filters usually find applications where the contaminant load in the coolant is not heavy and the particle size is large. The filters are usually used as protective devices to safeguard pumps, valves, pipes or coolant lines having small sections and where fine cleaning is not required. Many machine tool users have incorporated this type of a filter into the design of the machine's fluid circuit with the handle which controls the cleaning sweep readily available to the machine tool operator.

Absorptive Type Filter using a packed material constructed of a multi-filament substance. Used here for diamond swarf recovery. (Alsop Engineering Corp.)

The *Absorbent* and *Adsorbent* Types of filters are those which utilize a principle of depth filtration. This implies that the liquid must pass through a deep filtering medium as a method of removal of the solids from the liquid.

The absorptive type filters are those which are constructed of a packed material, such as cellulose, felt, waste, flannel or other chemically inert material constructed of a multi-filament substance which will retain the small particles which are to be removed by this type of a filter. This absorbent, Depth Type Filter is differentiated from the adsorbent Depth Type Filter which incorporates a filtering medium that both removes the small particles from the liquid and at the same time, either neutralizes or lowers the chemical activity of certain foreign substances found in the liquid.

In the case of the absorbent Depth Type Unit, you usually find these filters in the form of cartridges which are removed and replaced with new cartridges. One exception to this, is the case where diatomaceous earth is used as a filtering medium and here the diatomaceous earth is sloughed off or "blown down" for subsequent replacement with a fresh charge of diatomaceous earth. Diatomaceous Earth Filters are capable of giving a very high degree of filtration and have the particular advantage of exposing a very great filtering area in a small volume of Diatomaceous earth. The Diatomaceous Earth Filter has found a wide range of acceptance among the users of grinding and finishing machines. Its use is becoming more widespread as time goes on.

Diatomaceous Earth Filters are capable of giving cleanliness as high as 99.98% of all solids and removing particles down to one half micron. Various degrees of diatomaceous earth are available affording this filter some selectivity. The filter is very cheap to operate and if properly selected for the application, should give excellent results.

The Flotation method of cleaning coolant is that which utilizes the principle of agitating the coolant and introducing air, either through agitation or from another external source, such as compressed air, so that the coolant will foam. Some of the finer particles of contaminant found in the coolant will cling to the air bubbles as they rise within the coolant reservoir, lifting the contaminant to the surface. By means of a skimming device, this dirt, along with the generated froth, is moved into an area where with the break up of the froth, the solids will be deposited. A drag conveyor or some other type of mechanical device will usually remove these solids from this area of deposit.

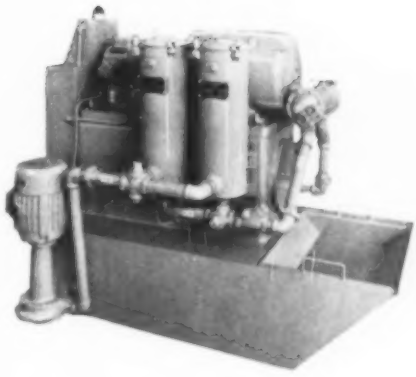
Flotation systems are applied only on water soluble or water additive types of coolants and have usually found favor among the central system user.

The heavier particles, which can not be elevated by the bubbles into the froth, usually settle to the bottom where a drag conveyor pulls these particles from the reservoir. The coolant pick-up on this type of equipment is usually mid-way between the bottom and top of the tank and usually follows some type of a baffling device to prevent the settled solids from migrating toward the point of coolant pick-up. This type of a device can not be used with the heavier grinding oils.

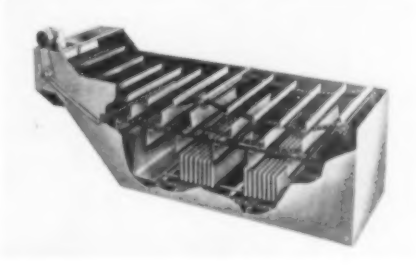
The installation of this type of equipment, in general, has the same advantages and disadvantages as any other central system. One major advantage that this piece of equipment has, however, is that it has no selectivity between ferrous and non-ferrous particles and there is no expendable filtering medium used. The energy requirements are not abnormal but you will encounter required maintenance on the pumps and the frothing agitator.

Combinations of settling, straining, centrifuging, magnetic separation, and filtering are possible and good coolant cleaning systems will usually incorporate more than one of the aforementioned methods of cleaning. Some of these combinations that we see today are settling and filtering, settling and flotation, settling and centrifuging, magnetic separation and positive filtering, magnetic separation and centrifuging, and there are cases where three-stage cleaning, such as settling, magnetic separation, positive filtration and centrifuging have been incorporated. In this type of a system, the final product must be clear of contaminant, neutral in acidity, and free of water. This latter case is by far the exception rather than the rule, but it exemplifies the degree to which some grinding and finishing machine users will go to achieve the degree of cleanliness of coolant they require for the job. • • •

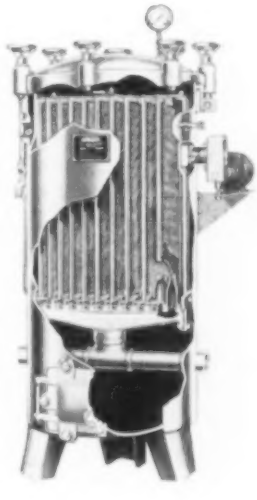
Part III reviews the various methods of installation and diagrams of these methods. Part IV covers the recommended methods of cleaning coolants for various grinding and finishing operations and a glossary of coolant cleaning terms. Reprints of the entire series will be available upon completion of publication.



Combination Straining and Depth Filtration are combined in this equipment. Good results are obtained by utilizing the best points of both methods of cleaning. (Sealol Corp.)



Combination of depth type and flotation is shown here. The fine, light particles are carried away by skimming while the bulk of the contaminant is filtered through leaf type elements.



Diatomaceous Earth Filter of the grid type. The earth is coated on both sides of the grid. The coolant must pass under pressure through one side of the grid down the center of the grid to the clean coolant discharge at the bottom. (Bowser Inc.)

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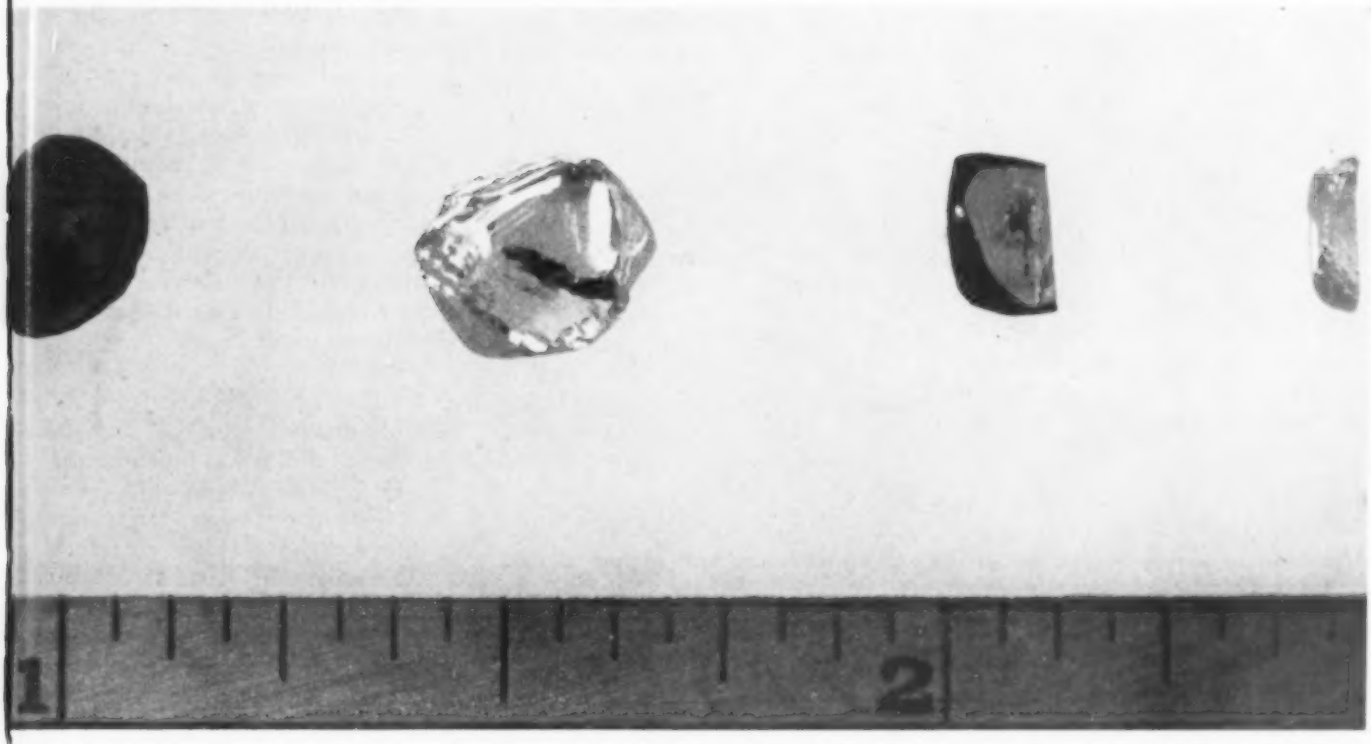


From left to right are shown the completely used standard diamond known as a "ballbearing," an unused industrial diamond, an oriented vector diamond slab laying flat and an oriented vector diamond slab on edge.

Increased Life and Accuracy of Diamond Dressers Achieved by Diamond Cutting and Orientation

- ✓ *Dresser fading eliminated.*
- ✓ *No adjustment of dresser needed.*
- ✓ *Consistent dressing quality.*
- ✓ *No resetting of the diamond in the nib.*

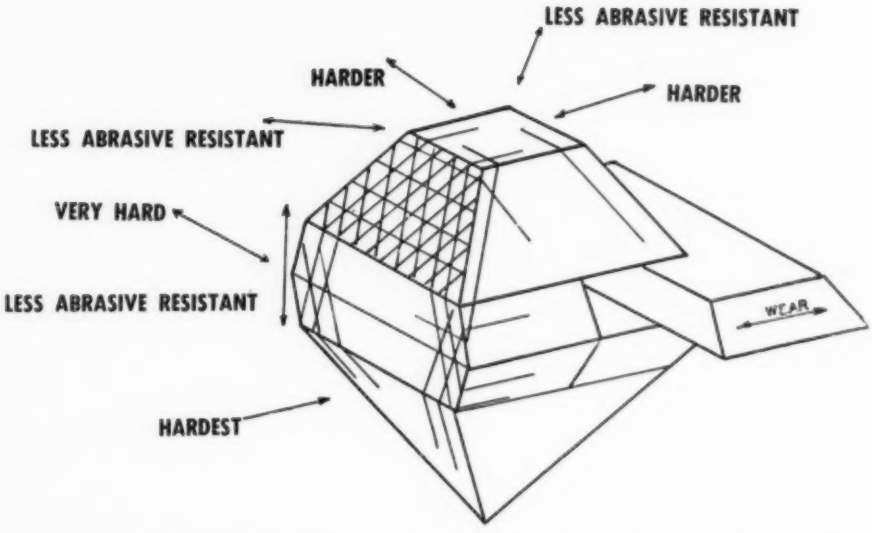
By **H. C. Miller**
Chief Research Engineer
Super-Cut, Inc.

• The successful development of laboratory techniques into practical production methods permits for the first time the manufacture of reliably oriented diamond dressers. It is now possible to take full advantage of the diamond's superior properties.

Since the adaptation of the diamond as a useful tool of the factory, the shaping, polishing and setting of the stone has been an art practiced only by the trained, skilled craftsman. His skill, highly developed through long experience, made it possible to determine the "grain" of the diamond and thus fashion a stone into a gem or a diamond tool by sawing, cleaving and polishing. His knowledge of the intricate hardness variations of the diamond has now been formalized and plotted through scientific investigations. Now that this hardness information has been combined with newly developed, much speeded-up, X-ray crystal orientation and transfer techniques, better producibility of diamond tool performance and full advantage of the unique vector hardness properties of the diamond can be passed on to the user of diamond tools.

The hardness or abrasion resistance of any face on a diamond varies with the direction of the abrasion, and for this reason the diamond is said to have vector hardness properties. When the diamond is oriented to present a particular hardness vector to the work, instead of essentially at random, as is the case for many of the present day diamond tools, it has become known as an oriented vector tool.

The faces of the diamond vary in their abrasion resistance. Under certain conditions of wear the hardness may be several hundred fold greater on the hardest faces than the soft faces. Within the faces the hardness may vary several fold, but predictably, such that in one direction the stone is very hard but at 90 degrees to this direction it is easy to wear. On another set of planes the hardness variation is repeated every 45 degrees. There are other areas of the diamond where it is hard in one direction and much less hard in the exact opposite direction. In practice a



This drawing shows the relation of the less abrasive resistant vectors to the harder or more abrasive resistant vectors.

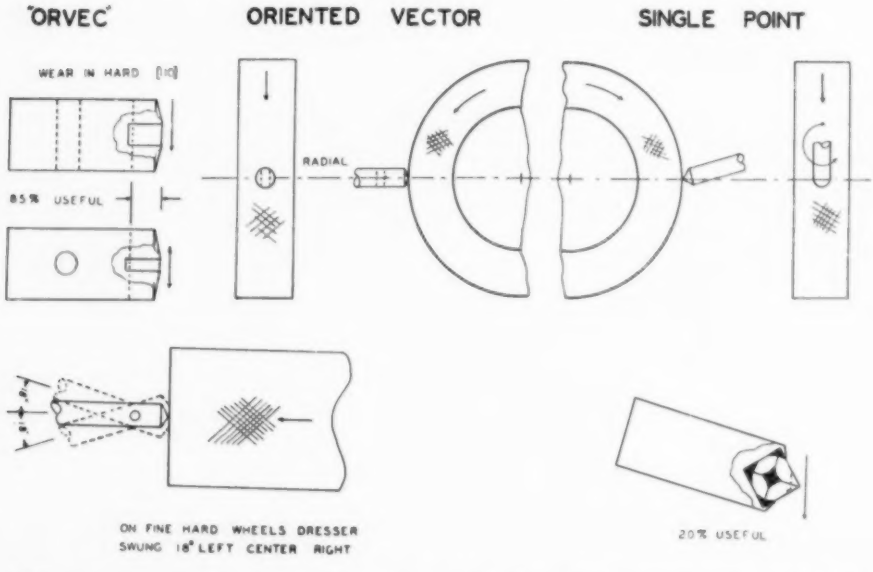
diamond is efficiently sawed or polished in only the least resistant direction, a limitation which calls on the skills of the diamond craftsman, but does not restrict the use of oriented vector in the diamond tool. Actually, the diamond craftsman can be greatly assisted in his work by the new techniques.

Equally as important as the hardness variations of the diamond are the mechanically weak planes known as the cleavage planes. These planes are responsible for the brittleness of the stone and are the reason some tools chip or break in use, especially on very rough dressing operations and on interrupted cut turning. This is particularly true if the planes are not properly oriented to the forces of the work being performed.

Conventionally diamonds are oriented for processing by visual observation of surface markings and about the only assistance used is a 7 to 10 power lens. The effectiveness of the method varies with the man and the type of the diamonds. This method has not been found reliable enough to produce consistently oriented diamonds in tools. Observation of many hundreds of diamond tools and sawed diamonds from many sources reveals a distribution of misorientations on at least one of the three axes of approximately 10 degrees and all too often 45 and even 90 degrees. The wide variation of orientation of the diamonds in a series of like tools easily accounts for a major portion of the variation in the performance of the tools. However, perfect orientation will not eliminate the effect of flaws and enclusions which all industrial diamonds contain to some degree.

To make possible the precise and reliable orientation of the diamond in process and in the finished tool, Mr. H. C. Miller of Super-Cut, Inc. has developed a rapid and complete procedure which eliminates all marking and handling of the diamond except for the initial selection of the stones. The method is based on laboratory techniques of back reflection X-ray crystal orientation, utilizing a photographic step. The method has been made rapid and simple enough to be practical in the shop without highly trained personnel. More recently the Diamond Research Laboratory of Johannesburg, South Africa has announced a similar procedure utilizing an electronic tube, known as an image intensifier, which eliminates the photographic step, and promises to be even more rapid in most applications. Both methods permit the precise orientation of the diamond to any predetermined vector and the transfer and mounting of the oriented stone in the tool nib.

The Golconda Corporation, a division of Super-Cut, Inc. has now taken advantage of X-ray orientation method and the hardness properties of the diamond to produce the "ORVEC" diamond dresser. By sawing a diamond into oriented slabs of appropriate cross-section and mounting these so that the ideal hardness vector is correctly oriented to the grinding wheel, a diamond dresser having many advantages is achieved. A benefit derived through the use of an oriented slab is that essentially all of the diamond is used up in dressing. Unlike the conventional single-point diamond dresser, where a stone of several times the



Above is shown the comparison in use of the single point tool and the oriented vector tool.

size of the slab is used, and after the maximum number of resets may have as much as 70% of the original stone remaining useless for dressing, the oriented vector slab dresser is truly a throwaway tool. With the "ORVEC" dresser there is no resetting; when it stops dressing it has no value and is thrown away.

The oriented vector slab dresser is addressed to the grinding wheel radially with the hard direction of the slab parallel to the plane of the wheel. As shown in the photograph the tool and its companion holder provide positive orientation of the tool. The holder provides for the 18 degree, left and right swing, when needed on hard wheels and compensates for the 15 degree drag angle in the dressing fixtures made for the conventional single point dressers. The tool and fixture combination are compact and will fit into most all grinders requiring straight dressing.

Another unique feature of the tool is the newly developed setting which securely holds the diamond through its life. Though it is abrasion resistant and protects the diamond from over exposure it is nonglazing to the wheel.

Some additional advantages of the oriented vector slab dresser are:

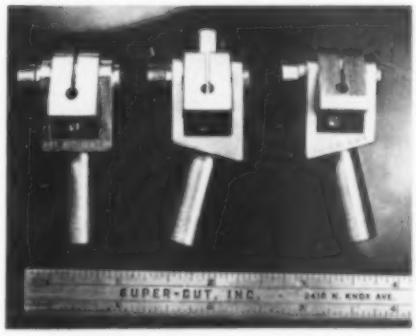
1. Consistent quality of dress and uniform finish of work due to the constant area of contact from dressing to dressing throughout the life of the tool.
2. Fading of the dresser is eliminated due to the orientation of the slab to the abrasion resistant direction of the diamond.
3. No adjustment of the tool necessary through its life except on very hard wheels where the holder provides for an 18 degree swing left and right of center.
4. The tool is useful over a wide range of wheel grits and grades thus reducing inventory.

Controlled laboratory tests have been conducted at Super-Cut, Inc. comparing dressers of several designs containing whole diamonds and slabs of various sizes and orientations. These were also compared with single point dressers. The present design of the "ORVEC" dresser was based upon the results of these tests.

The controlled tests were conducted on a Norton 6" cylindrical grinder with 3 x 20 inch wheels. The wheels were Sterling A60 MIL-VH, Simonds A80 N6-VI and Norton A54 K5VBE at traverse speeds of 20, 10, and 40 inches per minute respectively. The depth of cut per pass was .002 inch and the tools were flooded with a water soluble coolant.

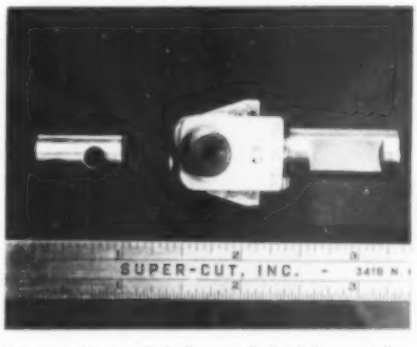
Under these test conditions single point tools using 1.2 carat diamonds of the finest quality were reset after 600 dressings. An average total life of 3000 dressings could be expected. Observation of the wear on the diamonds gave a rate of fading of .00025 inch per pass. The latest tools of the oriented vector design, under the more severe test conditions of an A80 N6-VI wheel at an increased traverse rate of 20 inches per minute performed 3000 dressings before reaching half the expected life of the tool. The rate of fading was approximately .00001 inch per pass, or a ratio of 25 to one in favor of the oriented vector tool.

Field tests in users' plants have confirmed laboratory tests. An oriented slab tool was placed in service on a 10 x 36 inch Cincinnati cylindrical grinder using 24 x 3 x 12 inch 60L wheel. The tool replaced a 1½ carat AA quality single point dresser which had to be reset every two to three weeks. The slab tool performed excellently for 12 weeks and was only partially used up. Though it is considered that the tool, which was of an early series, did not live up to expectations, the economies were favorable. While the observed lives of the two tools were approximately equal, the original cost of the single point tool plus the resetting cost are three times greater than the cost of the oriented slab tool. Of real importance, according to the machine operator, the tool dressed without variation, fading was eliminated and finish was uniform from part to part.

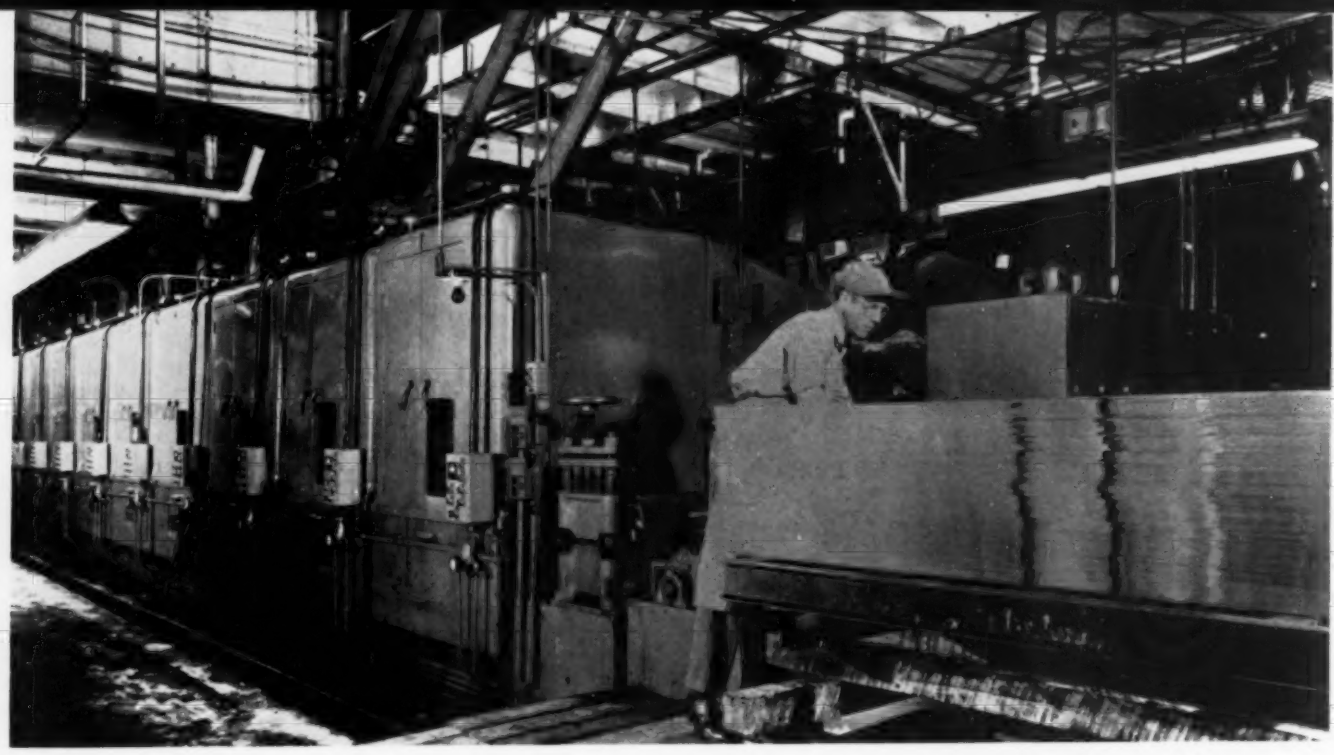


Three holders are shown to accommodate old fixtures of 15° angle and 0° angle so that dresser addresses wheel radially.

Another field test involved two oriented vector slab tools. This test was on a feed through Cincinnati centerless grinder using 20 x 8 inch 120 N grade wheels. This operation grinds 7000 parts a day on two 8 hour shifts. The wheel was dressed 7 times per shift, each dressing removing approximately .007 inch by various depths of cut. Each of these tools performed excellently for 7 weeks. The job was previously done with a cluster type tool which lasted an average of 5 weeks. Economically the oriented slab tool was equal to the cluster tool. It is interesting to note that the cluster tool replaced a 1½ carat single point tool because it eliminated fading, however, the cluster tool did not always give a uniform finish. It was the operator's opinion that the oriented vector tool did not fade and gave a uniform finish. He also has been able to reduce wheel dressing to a routine of a certain number of passes with confidence that the finish of the parts and the sharpness of the wheel will be equal to that of the previous dressings. • • •



"Orvec" tool left and holder right. Note hole in tool to orient tool. Position to 18° angle is accomplished by loosening set screw and pushing projections left or right to stop.



Murray-Way sheet polishers in tandem array handle quantity work at high speed.

How to Flat Polish Stainless Steel

by **Thomas C. Smith**
Product Engineer
Behr-Manning Co.,
Division of Norton Company

•Although stainless steel is specified for many applications because of its excellent corrosion resistance, its ability to develop and maintain selectively polished surfaces is an even more important reason why this metal is being chosen for a rapidly growing number of uses.

Even where it is to be fabricated by bending, shearing, welding or perforating, the annoying marks from such operations can be "hidden" in the surface of the steel when it is properly prepared. To meet the varying requirements of these operations, as well as those of drawing and forming, it has become necessary to develop a range of standard surfaces. There would be no point, for example, in developing a mirror-like surface condition on a sheet of steel which was later to be drawn or formed, imposing marks which would show all too distinctly. To offset this condition, definite grain-patterned surfaces are used; on them, such marks can be hidden by local touch-up work.

To meet the requirements of differing applications, the industry has developed standard finishes which take their ratings from the abrasive process used to develop them. Stainless steel sheets as originally hot rolled, annealed and pickled have a dark gray or black surface condition referred to as No. 1 finish —a condition not yet suitable for polishing operations. Improvement can be noted immediately if the sheets are cold rolled before annealing and pickling. This will result in a mill finish much better than No. 1 but which still has a dull appearance designated as No. 2D. This type of sheet is usually selected for drawing operations because, at this stage, it has good drawing qualities.

This surface condition can be improved further by additional light cold rolling passes which tend to brighten the surface, resulting in a No. 2B or Bright. It is this surface on which polishing usually begins. At this stage, the surface of the steel may exhibit numerous pits and slivers which must be removed before polishing can be started. Experienced examination of the surface is required in order to determine how coarse-grit must be used to remove these defects. In some cases, aluminum oxide belts

as coarse as 36 grit are used, followed by passes with 50, 60 and 80 grit aluminum oxide. Obviously, it is advantageous to start with the finest grit which will do the work.

When the surface has been cleaned of slivers and pits to an acceptable condition, a final series of passes—usually two in number—is made with a 100-grit aluminum oxide belt; the resultant finish is referred to as a No. 3. At this stage, of course, the material has a deep and definite grain pattern, and is used where fabrication is to be followed by additional final finishing.

To improve the No. 3 finish, the sheet may be given several passes with an aluminum oxide belt of 120 grit, followed by a 150 grit silicon carbide belt. This last pass imparts the standard No. 4 finish. The change to silicon carbide for the final passes is made in order to bring out the desired blue color or tone of stainless steel. Aluminum oxide tends to give the material a gray cast, silicon carbide a bluish cast. This blue color is desirable because it heightens the polished appearance. The No. 4 finish is by far the most popular where a minimum of final touch-up is desired after fabricating.

Following the No. 4, the surface can be advanced further with a 180-grit silicon carbide belt followed by a brushing operation with a Tampico brush. The brushing action tends to soften or dull the high reflectivity of the surface, giving it a satin appearance referred to as a No. 6 or Tampico-brushed finish.

Developing the finish further with a 240-grit silicon carbide and a 280-grit belt of the same abrasive results in a more finely grained surface condition which, when buffed with cloth and rouge, is identified as a No. 7 or highly polished semi-mirror finish.

Advancing this finish one more step with a 320-grit silicon carbide belt followed by cloth buffing and rouge gives the No. 8 or mirror finish. Actually, the difference between the No. 7 and No. 8 finishes may be difficult to detect; many

A modern battery of Hill-Acme sheet polishers in action.

Feeding stainless steel sheets to this battery of Acme polishers is expedited by a right-angle conveyor setup.

manufacturers fail to distinguish between them or offer both. Commonly, the No. 7 only is offered.

One of the most important operator functions in attaining these results is his "heading" of the belt. This is done by applying a film of oil to the stainless steel sheet as it passes out from under the coated abrasive belt. The coating of oil is usually distributed by a long-handled brush or a paint roller; the latter is preferable because it can distribute a uniform film of oil in one pass across the sheet and back. As the sheet then passes under the abrasive belt, this oil is transferred to the belt and, through the skill of the operator, builds up an even coating over the entire face of the belt. This is called a "head" or referred to as "heading" the belt.

The importance of proper heading cannot be overstated, because an uneven build-up of oil will tend to streak the surface being polished. Likewise, if pieces of swarf are allowed to embed themselves in the heading, a spotting condition will result on the surface. For this reason a "waster" sheet is often used during the breaking-in and heading-up operations on a belt before regular production polishing is started.

In the finer-grit belts from 150 and up, the heading is often done with a grease stick in preference to oil. Grease is best applied by rubbing the stick across the surface of the warmed sheet after the steel has been passed back and forth under the belt at least once. Here, too, good heading is equally important.

With belts of finer grit, the condition of the joint formed in belt manufacture is of utmost importance. Properly manufactured belts have a joint as thin as or slightly thinner than the rest of the belt. Even under the best manufacturing conditions, any joint represents an interruption in the uniform surface of the belt, and this interruption will tend to mark or show on the surface of a highly polished sheet. Experienced operators easily overcome this condition by proper application of grease, which fills in the surface of the belt and blends over the joint condition.

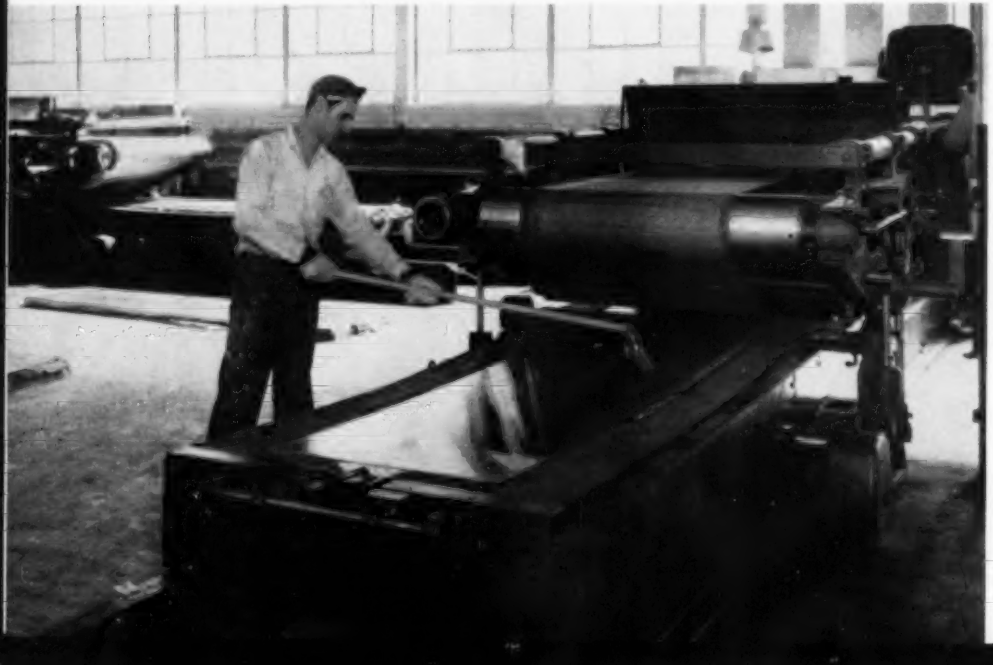
Equipment for sheet polishing all has the same basic design consisting of a coated abrasive belt passing over two or more rolls mounted in a horizontal plane; immediately below the lower or contact roll (which backs up the belt where it touches the work) is a pressure roll which can be raised and lowered by air pressure. This is called the billy roll.

The condition of the contact roll which backs up the belt at its work point on the sheet being polished is also extremely important. Worn or grooved rolls will create streaked and uneven conditions on the sheet surface. The abrasive belt being used is usually 2 in. wider than the sheet being polished. Where the edge of the sheet passes under the belt, a gradual grooving condition of the contact roll results. Thus it is always advisable to polish wide sheets first, following them with progressively narrower sheets so that edge grooves imposed by the wider sheet widths are not passing over the surface of narrower widths.

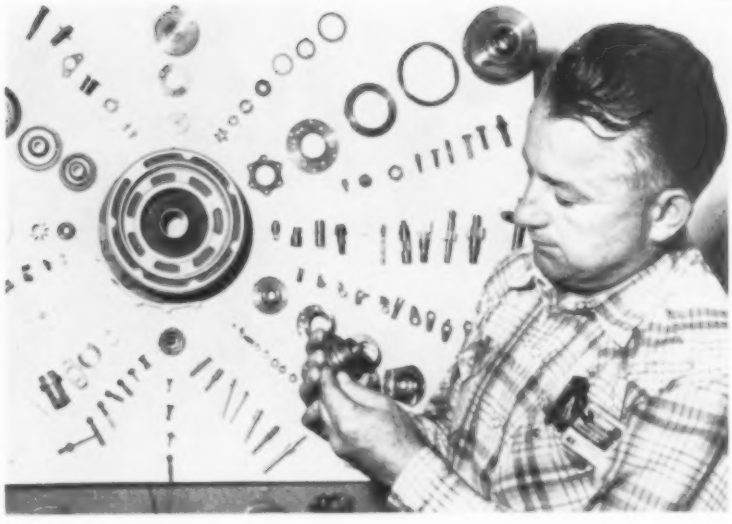
When it is necessary to go from the narrow to greater widths, the face of the contact roll should be dressed, taking a light cut off its surface to remove any possible grooves. These rolls are faced with rubber, usually of 50 to 60 Durometer, and are completely smooth. However, where extremely bad surface conditions of the steel sheet are continually encountered, additional aggressiveness can be obtained either by using harder rolls such as 70 Durometer, or by cutting spiral grooves in the face of the roll itself.

With the excellent polishing machines now available plus the uniformity of factory-coated abrasive belts, the operator has the best tools possible with which to obtain uniform, standard finishes which bring out the real beauty of stainless steel and broaden daily the number of its applications. Although millions recognize the material as it shines on restaurant counters, sinks and building hardware, fewer appreciate how it protects dairy products and other foods in processing. Nor do they know how vital stainless steel in its No. 8 finish becomes when used as press plates in the plastics industry. Production of uniformly smooth plastic counter panels depends on the mirror finish of stainless steel. Equally, polished sheets serve in the preparation of the printing industry's lithotype plates whose defect-free surfaces are plated with copper to receive the printing image.

New uses are being developed constantly, based on a superior material whose fullest advantages are being realized only through the use of standard finishing practices made possible by coated abrasive belts. • • •



This polishing operator is spreading oil smoothly over the stainless steel sheet—not on the belt—in order to get smooth, consistent polishing.



Display of wide range of sizes and intricate shapes of parts processed by mechanical finishing methods. The smallest pins and washers as well as large castings are processed to high degree of finish and tolerance.

Reduced Costs, Better Finish and Higher Production

• Precision finishing of magnesium, aluminum, bronze and steel is a highly important operation at the AiResearch Manufacturing Division of the Garrett Corp. in the Phoenix, Arizona plant. Their problem has been twofold: (1) turning out more finished pieces of work per week and (2) maintaining a higher degree of tolerance and uniformity. Since no solution was to be found through the hand-finishing methods being used, other sources of help and information were investigated.

Samples of various time-consuming parts were sent to Roto-Finish Co., Kalamazoo, Mich., for analysis and finishing recommendations. Among them were several gear units and a number of intricate pieces of various sizes and shapes such as those shown in the photograph. They required finishing to highly exacting tolerances. After processing in Roto-Finish laboratories, the gears and other parts were returned in finished condition. They were accompanied by a detailed report of data and specifications covering finishing processes recommended to do the job.

The first Roto-Finish machine, a four-compartment unit of 10 cu. ft. capacity, was purchased and installed at AiResearch. Following installation, the company sent its finishing department foreman to Kalamazoo to work in the processing laboratories of the supplier. His job was to study at first-hand the equipment's features and learn methods for adapting them to various types of precision finishing operations. Most important was the data gathered on time cycles, loads and additives, and how to apply them properly in varying combinations to the finishing work required.

It was found that rejects of Roto-Finished items were less than one-sixth that of hand-finished items. Quality and quantity were uniform and results showed a high degree of improvement. Mechanical finishing further eliminated 50% of work on certain types of materials.

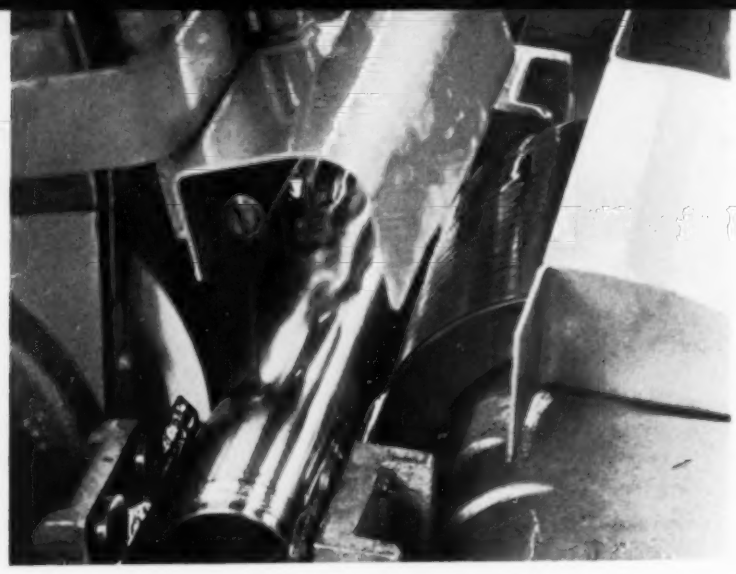
Proof of the value of the research program became quickly apparent when a quantity of 12,000 work pieces was mechanically finished in 2½ hours. Originally, the same job would have required two weeks of one man's time working eight hours a day, six days a week, using hand finishing methods.

Prior to installation of the mechanical units, three shifts totalling 82 men working six 8-hour days a week hand-finished 12,000 to 14,000 pieces in a week's time. After installation, two shifts totalling six men working five 8-hour days a week using Roto-Finishing methods turned out from 30,000 to 60,000 pieces during the same period—three to five times the previous output. Added benefits resulted when 70 of the 82 finishing workers were integrated into similarly productive jobs in other departments.

Today, AiResearch's mechanical finishing department is a smooth-running, efficient operation. A special feature is the card filing system covering every part going through the finishing process. Each card records the time cycle used, amount of water, type of compound and media, and number of parts that will constitute the proper load.

• • •

Media and compound being poured into a barrel finishing machine. Hoist is rigged to carry loads in either direction from machine to media bins and back.



Brass cylinders (which house piston rods) are polished with 180 grit aluminum oxide belt. Rate of feed is controlled by adjustable angle of regulating wheel on right. Abrasive belt life is reported to be 1500 product feet.

Precision Belt Grinding of Piston Rods and Cylinders

• The production of pneumatic cylinders for use in drill press feeds, hydro checks, rotary index tables, etc., manufactured by The Smith-Johnson Division of The Bellows Company, Glendale, California, requires a precision belt grinding of stainless steel piston rods to a tolerance of .0005" and surface finish of 8 micro-inches. Since the entire piston assembly (constructed of heavy steel plate and synthetic rubber piston cups) is housed in a brass cylinder enclosed at both ends, it is essential in the manufacture of these parts that the movement of the piston rod in and out of the cylinder be smooth, steady, and accurate, even when the cylinder is operating on only a few pounds air pressure.

Stainless steel piston rods, used in manufacture of air cylinders, are precision ground in a single pass to .0005" tolerance a surface finish of 8 micro-inches on this Engelberg centerless belt grinder.

These qualities are now being obtained by precision sizing of the piston rod on an Engelberg Huller model L-4 centerless belt grinder.

A 300% production increase has been achieved over previous methods of grinding and finishing. Formerly the Smith-Johnson Div. utilized a shop-built revamped lathe with a belt sander mounted on the carriage. Problems encountered were poor belt life, and excessive maintenance of the machine. Smith-Johnson currently uses a 400-grit silicon carbide abrasive belt backed by a 65 durometer rubber contact wheel mounted on a ground spindle. The abrasive belt, run wet with oil coolant, is reported to be highly resistant to loading because of the flushing action of this coolant, which is jet-sprayed from the machine above the work area. Average belt life is 1200 product feet. (Belt changes take less than one minute.)

Parts are through-fed at the rate of 84" per minute; rate of feed is controlled by the adjustable helix angle of the regulating wheel and by change gears which drive the regulating wheel at different rpm. (For this application Smith-Johnson uses 52 rpm.) Change gears are readily accessible, requiring less than a minute to change from one ratio to another.

Among other uses, it was found that this wet belt grinder also lends itself to polishing and finishing the brass cylinders that house the stainless steel piston rods. The tubes are first cut to lengths of 1½" to 36" and then fed to the centerless grinder for polishing. This produces the clean, bright, even-tone required before protective coatings are applied.

For this work 180 grit aluminum oxide belts are used, with a through-feed rate of 20" to 32" per minute. Stock removal is .005" with a high quality uniform surface finish. Average belt life is 1500 feet of tubing. (Previously the cylinders were sanded by hand on mandrels. Operation was painstakingly slow, with no assurance of a uniform surface.) Present method eliminates scrap and has resulted in a 100% production increase. • • •

Through fed at the rate of 20" to 32" per minute, the brass tubing is given high polish prior to applying protective coating. Method shown above eliminates scrap. 100% increase in production has been achieved.

"Only the Strong Shall Remain Free"

From an address by Ludlow King,
Executive Vice-President,
National Machine Tool Builders' Association.
Before the Thirty-Fourth Spring Meeting of
The American Machine Tool Distributors'
Association

One axiom remains exactly the same as in our forefathers' day, and we must never forget what they learned so well: "Only the strong shall remain free."

We all become so involved with our day-to-day living, our desire to do a better job, and our interests in acquiring more for our families, that we tend to rationalize some of the factors which enable us to attain our immediate objectives. We become more and more apathetic to those forces which might bleed our country of vitality and ability to continue its present dominant position in the world. Let's revitalize our interest and take more positive action concerning matters of destructive nature. Those people in Washington who are steering our Ship of State want our comments and guidance—they need it—and as citizens we owe them our best opinions. Let's make sure we receive and fully comprehend all of the facts concerning our government's activities and commitments. In general, let's take a greater personal interest in keeping a powerful national defense.

The importance of the U.S. machine tool industry is apparently well understood by our government; and if it is dedicated to retaining a strong national defense, the health of our industry is imperative.

Back again to the strength of this country and our own national defense. The one thing that troubles me more than any other is the exodus of United States machine tool builders to foreign countries. I fully understand our State Department's desire to have the people of this country invest abroad, but why should it be in the area of our most basic industry? Practically every day during the past two years, one or more American machine tool builders have been searching for new locations in foreign countries. Some are building new plants, some are buying existing facilities, and still others are making arrangements with European concerns in order to stay in business. One member builder has a program to spend eight per cent of its expansion capital abroad during the next ten years. These plants do not strengthen our country, they do not provide work for the thirty thousand unemployed machine tool builders in this country, they do not provide taxes for our State and Federal Government, and above all, they cannot help defend this country in the case of an emergency. On the contrary, they will be in the immediate grasp of the Russians to use against us, if and when the Russian Army starts marching across Europe.

Frankly, I think our government should do everything possible to change the prevailing conditions which practically force our builders to locate abroad. Keep them home in the U.S.A. to provide strength and muscle for our own economy and national defense.

To the axiom "Only the strong shall remain free," we might add, "Only the highly productive can remain strong." • • •

H○LES

JIG GROUND with

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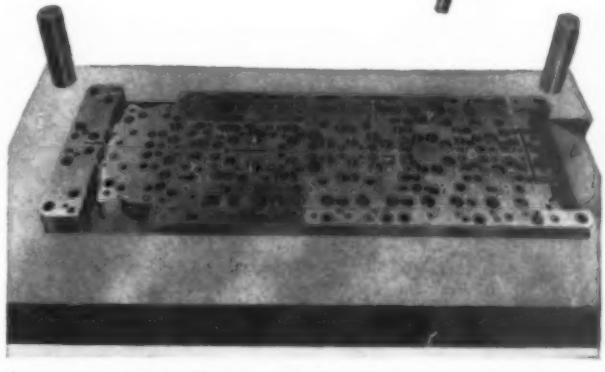
Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.



A seven station die from Vulcan's contract Tool Room (Your Tool Room in Dayton).

Standard sized punches and buttons were used. But since forming and piercing operations were involved, hardening of the sections was necessary followed by JIG GRINDING. Result: Close tolerances held easily and perfect progression throughout — another satisfied customer.

*Vulcanaire equipment pays for itself on the first job.

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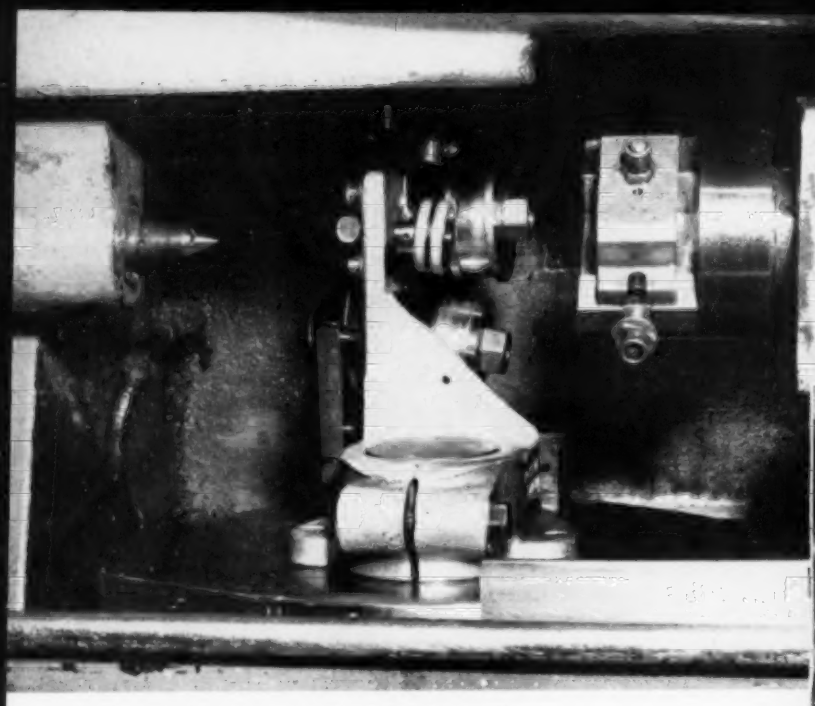
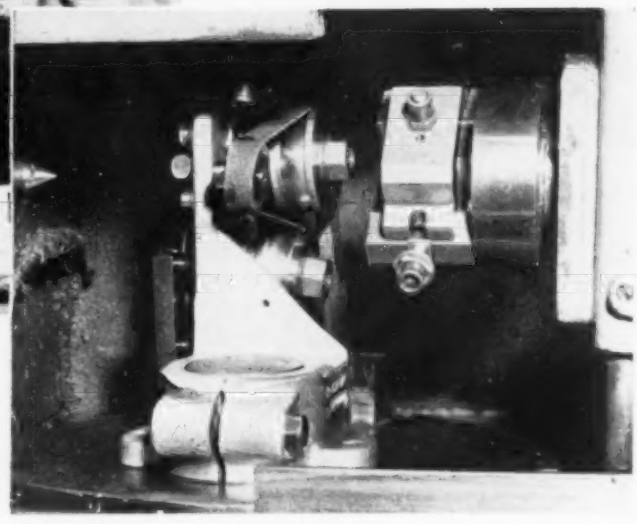
VULCAN tools



Disogrin contact wheel is shown in position on a Utica airfoil grinding machine. The black line on the wheel is a marking drawn to determine the center of the wheel.

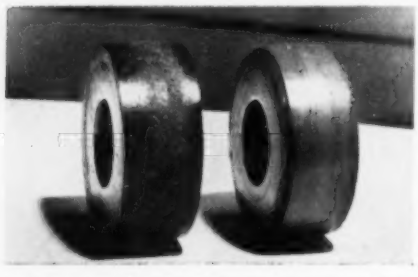


Disogrin contact wheel is illustrated with the emery grinding belt in place.

NEW CONTACT WHEEL IMPROVES AIRFOIL GRINDING

• High wear characteristics of urethane material helps maintain close turbine-blade tolerances within .0001 of an inch.

Maintaining a maximum limit of .0001 inch reduction of contact wheels in turbine-blade belt grinding was, for some time, a major problem for the Utica, New York, plant of the Utica Drop Forge and Tool Division of Kelsey-Hayes Company. Due to pressure of the blade on the contact wheel which rotates at about 1300 RPM, the wheel would wear beyond this close limit, lose its contour and cause difficulty in keeping the extremely close tolerance necessary for the blades. Wheels had to be replaced approximately every 5 hours in order to hold the proper shape and tolerance of the blades.



Contact wheels show comparative wear after use on airfoil grinding machines at Utica Drop Forge & Tool Division of Kelsey-Hayes Company. Wheel on the left is Neoprene, and due to the pressure of the turbine blade on this wheel, rotating at 1300 rpm, the wheel wore beyond the required dimension (.0001 of an inch), lost its contour and caused considerable difficulty in keeping the close tolerances necessary for the blades.

The need to maintain high production and reduce replacement costs of contact wheels prompted Utica to try various changes in wheels and operation. An unsuccessful effort was made to lessen the pressure on the wheels by attaching springs to the motor. The wheels used proved either too hard and flew off the machine or were too soft and would melt under the friction generated by the belt's speed.

In the later part of 1955, a urethane elastomer material called Disogrin was supplied by Disogrin Industries Inc. for use as a wheel on one of the belt grinders. Utica tested the wheel under severe conditions. The feed rate was almost doubled and the traverse speed was accelerated from 1/16" per revolution to ¼" per revolution. The test conditions were maintained for six days eight hours per day. This test proved that the material would stand up to the requirements of the application.

As a result of this test Utica immediately ordered Disogrin contact wheels for all their grinding machines. Since this order was placed Utica has concluded that the new contact wheels, used under the same conditions and at the same rate of operation, are able to maintain their tolerance for the production of 40 blades as compared with a production level of 20 blades attained by the previously used wheels. • • •

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Engineers and production men know that lots of improvements, in product or manufacturing, come only with experience. Sometimes it's a supplier's special information, like Clover's experience in abrasives, that makes the difference.

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X-RAY ORIENTATION USE IN

Presented by the

ILLINOIS INSTITUTE OF TECHNOLOGY

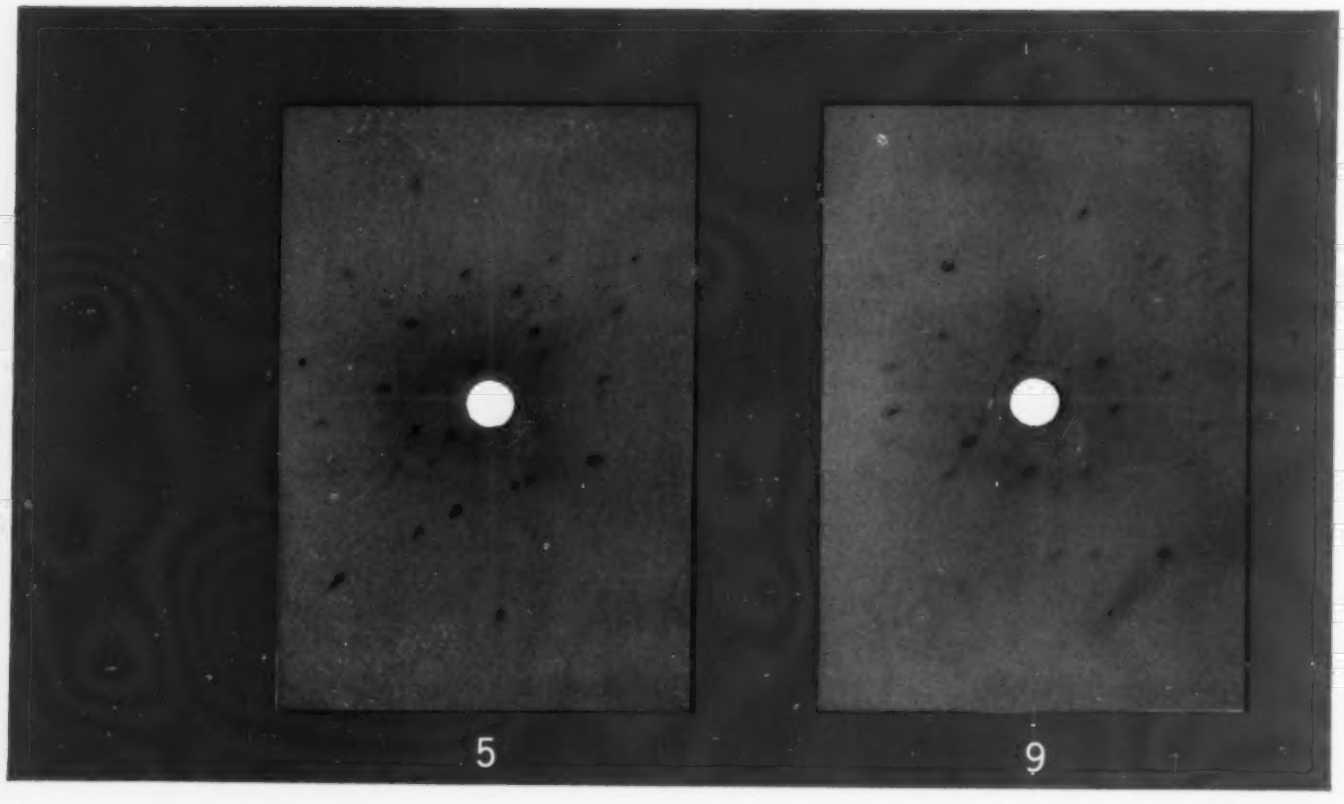
in collaboration with the Diamond Research Laboratory

at the TOOL SHOW

AMERICAN SOCIETY OF TOOL ENGINEERS

Booth 1850, Convention Hall, May 1 to 8, Philadelphia, Pa.

Papers on the orientation of diamonds and the performance of oriented diamond tools will be presented at the A. S. T. E. Symposium on May 5-6.



in diamond tool efficiency—the new

OF DIAMONDS FOR DIAMOND TOOLS

This new, major advance provides...

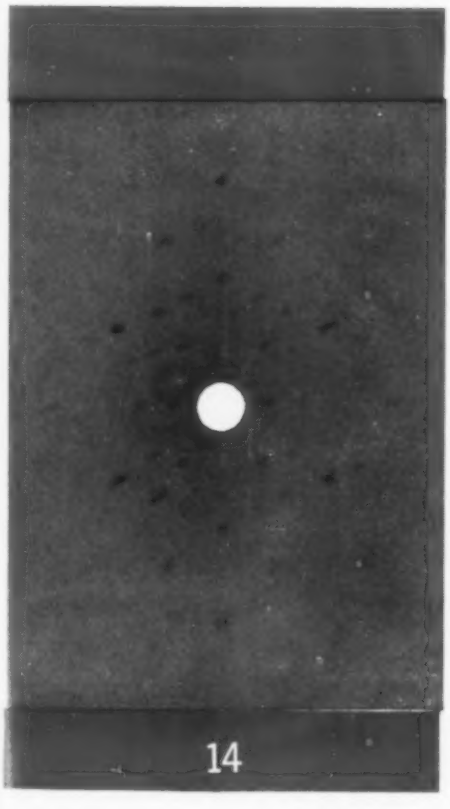
1 Standardization of diamond tools!

2 Substantially longer diamond life!

3 Optimum diamond tool use!

4 Predictably longer tool operation in production runs!

5 Worth-while cost savings!



WHICH OF THESE DIAMOND TOOLS WILL OUTPERFORM THE OTHERS 3 to 1?

Here are X-ray diffraction patterns of Hoglund dressing tools. X-ray diagrams No. 9 and No. 5 are typical of the orientation of tools manufactured by conventional methods. No. 14 is an X-ray diagram of a tool precisely oriented by *X-ray diffraction.* It will *outperform conventional tools 3 to 1!*

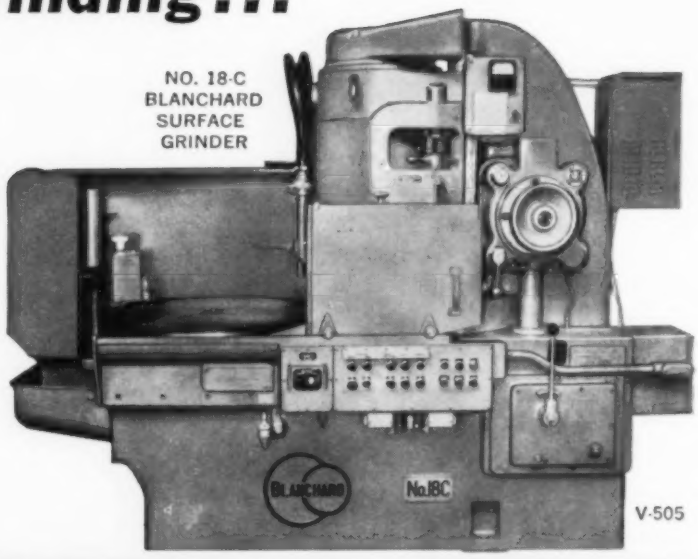
Through the use of X-ray orientation a whole series of Hoglund tools can be properly oriented easily by diamond tool manufacturers.

Hoglund tools are only one type of diamond tools in which X-ray orientation produces remarkable increases in performance. Plan now to see this detailed demonstration of X-ray oriented diamond tools . . . and so it won't slip your mind, clip this ad as a reminder.

DIAMOND RESEARCH LABORATORY Johannesburg, South Africa

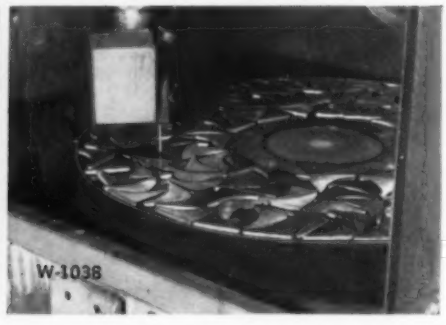
For better, easier grinding...

Whether you're "hogging" off stock from rough castings or precision grinding to a tolerance of ±.0005", you can do it better and easier with the Blanchard No. 18-C Surface Grinder. Once the work is set up, the automatic cycle handles every operation from start to finish. The operator is free to prepare the next load of work or to operate a second No. 18-C Grinder.



Cast Iron Plate. Blanchard ground at the rate of 30 pieces – 60 surfaces – per hour. Stock removal ⅛" each side.

Steel Bars. Blanchard ground at the rate of 48 pieces – 192 surfaces – per hour. Stock .040"-.045" from each side. Limits ±.001" square, flat and parallel.



Hot Rolled Steel Cams. One operator and one No. 18-C Blanchard produce 225 pieces – 450 surfaces – per hour. Stock removal 1/32" each side. Limits ±.001".

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- Automatic size control to ±.0005"
- Duplication of repetitive loads
- Pre-set "spark out" time for flatness and surface finish
- No more "operator worry" on close work – greatly reduced fatigue
- A large part of operator's time available for
  (a) Handling or slushing work pieces
  (b) Filing burrs
  (c) Selecting correct wheel and preparing for next job
- Specially-designed sizing device with built-in feature to compensate – automatically – for wheel wear during grinding cycle.

All of these features give you *more efficiency at reduced costs!*

PUT IT ON THE BLANCHARD

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A A Gage Co.
Booth No. 532

Aaron Machinery Co.
Booth No. 1571

Airborne Instrument Laboratory
Booth No. 1918

Alina Corporation
Booth No. 1774

Universal eccentric and coordinate head, Unexko, eliminates repeated setups and centering of work pieces. Dependable hydraulic blocking of main spindle. Graduation of degrees and index plate easily visible, securing reading accuracies of 1′ resp. 0.001 mm.

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Almco—Queen Products Co.

Booth No. 2101

Feature of the DBO-2A barrel finishing machine is built-in screening drawer separating system for speedily segregating media from work load. Variable barrel speeds from 8 to 38 rpm. Handles loads to 700 lb.

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Alsop Engineering Corporation
Booth No. 1062

The Alsop method of sub-micron filtration in a range of sizes to be introduced. It has demonstrated economies in over 12 areas in filtration of coolants, cutting oils, and hydraulics.

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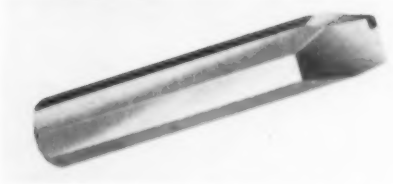
American Coldset Corp.
Booth No. 1860

Coldset form tools, set in special M-28



metal, is designed for use in Jones and Lamson, Ex-Cello, Hoglund and similar form grinders where a tolerance of .0001 is important, and must be kept in radius and angle.

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Conferences and Speeches Concerning Abrasive Operations

SATURDAY, MAY 3

Surface Finishes

1:30 P.M. — **South Garden, Bellevue-Stratford Hotel**

"Gear Tooth Honing—A New Approach to Improving Gear Surface Finish" (Paper No. 77), by B. F. Bregi, Vice-President, National Broach & Machine Co.

"Obtaining Specified Finishes by Honing" (Paper No. 78), by B. R. McConnell, Sr., Honing Engineer, Sunnen Products Co.

MONDAY, MAY 5

General Tool Engineering III

10:00 A.M. — **Room 200, Convention Center**

"Automatic Size Control For Centerless Grinders" (Paper No. 88), by Arthur Parnes, Project Engineer, Airborne Instruments Laboratory, Inc.

"The Significance of the Surface Finish Produced by Electro-Discharge Machining" (Paper No. 89), by Charles H. Good, Plant Manager, Micrometrical Development Corp.

Tooling For Metal Powder Parts

Third Session: — **8:30 P.M.**

Chairman: D. H. Renfrew, Chief Engineer, Link-Belt Co. "Finishing Operations" (Paper No. 115), by Peter E. Young, Research Metallurgist, Metallurgy Dept., Scientific Laboratory, Ford Motor Co.

TUESDAY, MAY 6

Diamond Tools II

9:45 A.M. — **Room 300, Convention Center**

"Oriented Diamonds Give Maximum Performance in Formed Dressing Tools" (Paper No. 99), by Joseph Klipper, Vice-President and General Manager, Clipper Diamond Tool Co., Inc.

"The Oriented Vector in Diamond Dressing Tools" (Paper No. 100), by Harold C. Miller, Chief Research Engineer, Super-Cut, Inc.

For SUPER Finishes
you need
SUPER Filtration•••

FILTER
Furnished in capacities from 0.1 to 750 gpm. Various cartridges available for mineral and inhibited detergent oils.

OIL RECLAIMER
For complete oil reclaiming. Removes solids, acids and volatile impurities; moisture, solvents, gases, etc. from hydraulic fluids by heat-vacuum process.

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HILCO HYDRAULIC OIL FILTERS

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HILCO CUTS COSTS BECAUSE IT ELIMINATES . . .
√ VARNISH AND SLUDGE DEPOSITS
√ FLUSHING AND MANUAL CLEANING
√ FREQUENT OIL CHANGES
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ASTE Tool Show . . .

American Herforder Corp.
Booth No. 1307

B. C. Ames Co.
Booth No. 227

Anderson Oil and Chemical Co., Inc.
Booth No. 331
Featured will be the metalworking fluids, Lusol, Shamrock, Winsor K-7, and UniKool, all making for cleanliness, and elimination of odors of machining. Winsor odorless machine cleaner No. 607 to be introduced.
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R. B. Annis Co.
Booth No. 1077
High intensity demagnetizer, with 6" tubular opening, quickly demagnetizes production parts and products before finishing. It removes metal dust and particles. The unit may be mounted at any desired angle.
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The Aro Equipment Corp.
Booth No. 1810

Austin Industrial Corp.
Booth No. 1471

Beaver Pipe Tools, Inc.
Booth No. 639
Available on the manufacturer's new abrasive cut-off machines, or for those already in use, is power head to actuate the cutting wheel, automatically, and also power work feed. Two speed-cut abrasive machines to be demonstrated.
Use postpaid card. Circle No. 39

Bendix Aviation Corp.
Booth No. 936
The Bendix tape control system controls production of machined parts from design drawing information, without use of templates, cams, etc. The system will operate a 3-axis milling machine at exhibit.
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Besly-Welles Corp.
Booth No. 632

Edward Blake Co., Inc.
Booth No. 1646
The Blake flute grinder claims to make certain of uniform rake angle and accurate indexing. Any rake or hook angle is said to be exactly duplicated with the grinder, and spiral points of tap can be reground quickly.
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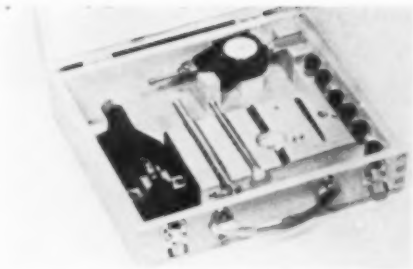
Boice Gages, Inc.
Booth No. 234
A new bore gage has been added to Tri-o-set kit, which with use of 4 exten-



sions, covers a range of .084″ to .125″. The 2/0, added to kit, offers greater range—taking but 4 gages, 15 extensions, to cover from .084″ to 1.000″.

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Bokum Tool Co.

Booth No. 414

Boyar-Schultz Corp.

Booth No. 1539

Brown & Sharpe Mfg. Co.

Booth No. 122

Finger tip control micrometer is convertible at will to either friction or fixed type. Oblique angle graduations on the barrel provide positive reading. Micrometer has range of 0 to 1″, reading in ten-thousandths of an inch.

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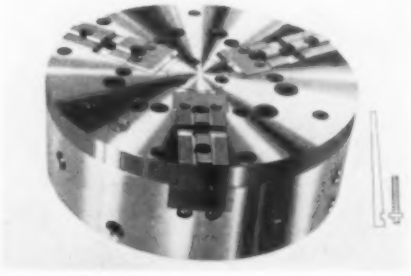
Buck Tool Company



Booth No. 804

Precision high speed power chuck has a mid-section of aluminum and new design jaws which reduce weight by 40% for better maintained gripping at high speeds. The main feature is the take-up for wear provided by two tapered gibs, working on tapered keyways, under each jaw. The chucks are available in 2-jaw and 3-jaw designs in 6½″, 8¼″, 10″ and 12″ diameters.

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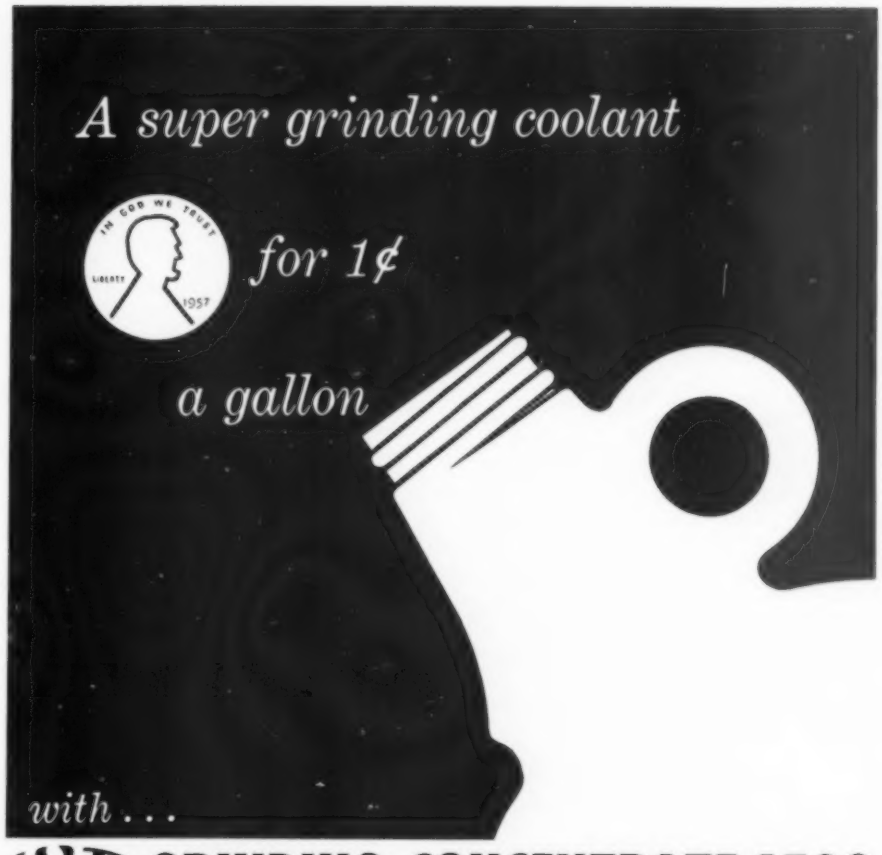
Buckeye Tools Corp.

Booth No. 705

The self-feeding drill, to be featured in two new designs, is capable of drilling, tapping, reaming, counterboring and countersinking, has a capacity of 3/16″ and a stroke length of 2″. It can



W+B GRINDING CONCENTRATE 1500

Normal dilution for this entirely different type of coolant is from 150 to 200 parts of water to 1 part W & B Grinding Concentrate 1500. And since W & B 1500 is used in extreme dilutions, one 55-gallon drum provides up to 11,000 gallons of grinding coolant — at a cost of about 1¢ a gallon.

Foamless as water, W & B 1500 gives excellent rust protection and provides a transparent mix that really keeps wheels open. Grinding is keener . . . machines stay cleaner. Chips settle almost instantly. Get complete information on this outstanding grinding concentrate. Fill out and return attached coupon.

W & B Grinding Concentrate 1500 is being used by many of the country's largest manufacturers.

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Please send me complete information on W & B Grinding Concentrate 1500 — and the list of large users.

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☐ My plant has a tricky grinding problem on which we'd like advice. I've attached a letter describing it in detail. I understand that you offer this service without obligation.

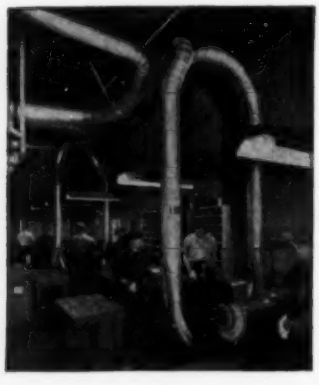
In the modern NUTONE plant

...6 DIFFERENT INSTALLATIONS By KIRK AND BLUM!

Overhead conveyorized Paint Drying Oven installed complete by KIRK & BLUM.

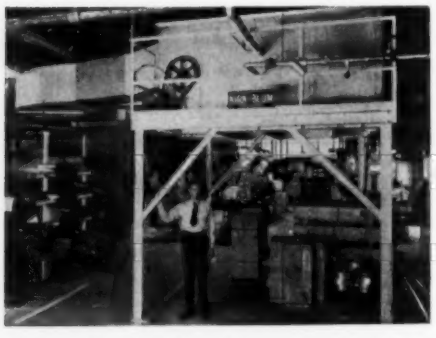
- 2 dust control systems
- Degreasing and acid etching ventilation
- Paint spray booths (installed only)
- Paint drying oven and conveyor
- Make-up air supply system

A variety of problems in the Finishing Departments of NuTone Incorporated were solved by KIRK & BLUM Engineers. Shown here are the various installations which were designed, fabricated and installed by KIRK & BLUM. Of special importance is the "Make-up" Air Supply System which filters, heats and replaces air exhausted by the other systems, eliminating undesirable winter drafts. The wide experience of the KIRK & BLUM organization is at your service. "Clean Air . . . the Invisible Tool" can do much to increase the efficiency of your operations. For more details and literature, write the Kirk & Blum Mfg. Co., 3124 Forrer St., Cincinnati 9, Ohio.



Two KIRK & BLUM Dust Control Systems serve the polishing and buffing room.

Fume Removal System in the Acid Etching and Degreasing Department.



"Make-up" air supply system replaces air exhausted from plant.

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DUST AND FUME CONTROL SYSTEMS
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be operated through solenoids, time switches, or any similar devices, including trip mechanisms actuated by the parts to be worked.

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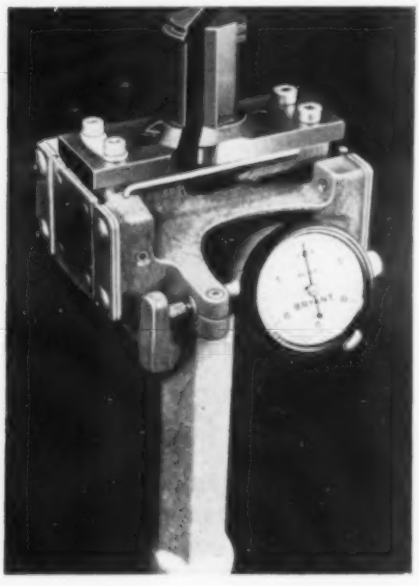
Bryant Gage Div.

Booth No. 123

Split plug-type thread segments, made to engage a single thread, for checking pitch diameter of internally threaded



parts, will be introduced They can be mounted on Bryant indicator-type thread comparators, either B-21, bench or P-21 portable.

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Cawi Machine Co., Inc.

Booth No. 972

Spiral drill grinding machine, Model N-4-90-Z, is reported capable of grinding cylindrical pilot on counterbores, pilot drills, etc. This and reliefing of cutting edges is done in one operation on 2-, 3-, and 4-lipped tools.

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MOGUL-IZING wet-type dust collectors save $4,940.00 annually at HOUDAILLE INDUSTRIES, Inc.

MOGUL is added to collector through this clean out door, previously used as access for hand cleaning.

Sludge now remains soft and is easily removable. Prior to MOGUL treatment it was necessary to use a pick to loosen the hard mass.

Write for *additional Performance Reports* and complete information without obligation.

The North American

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Products Company

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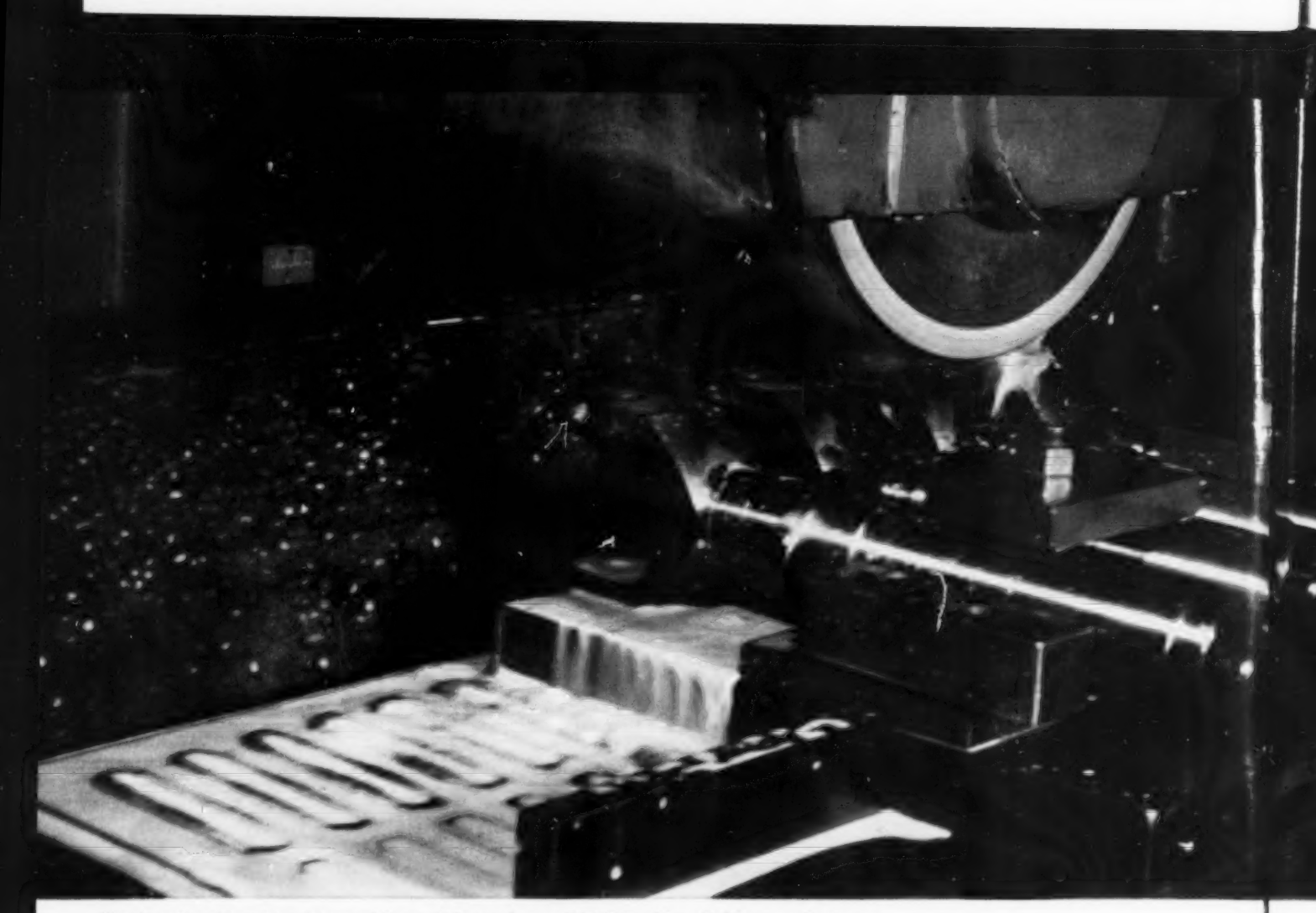
The nationally known firm of Houdaille Industries, Inc., manufacturers of high quality automobile hardware, operate twelve high speed belt polishers in the manufacture of automobile bumpers at their Huntington, West Virginia plant.

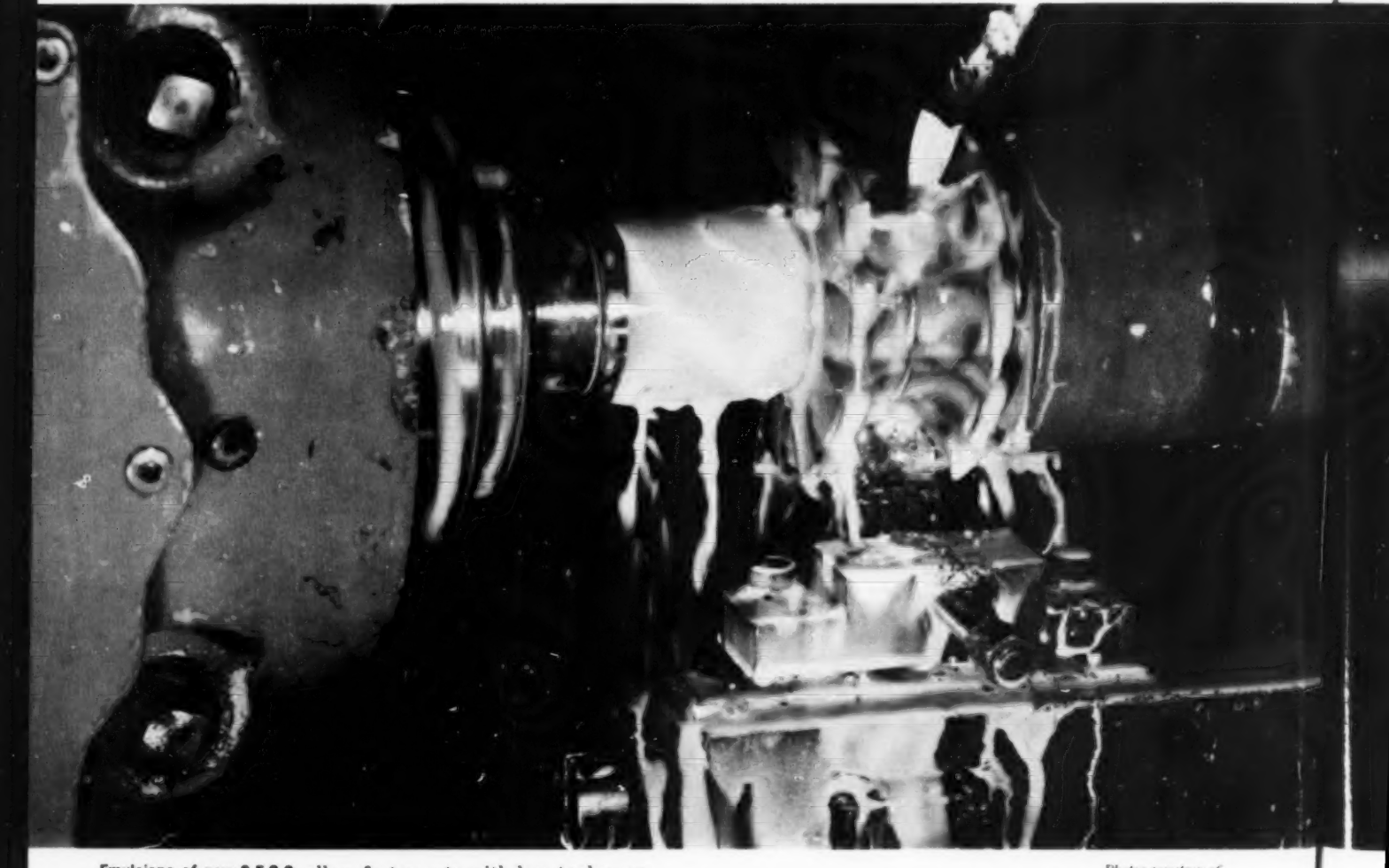
Mr. Larry E. Day, Plant Engineer at Houdaille, ran a 30 day test with MOGUL endeavoring to eliminate the sludge problem and, at the same time, to operate the system at a higher efficiency. Results were so conclusive that MOGUL is now used in the entire dust collector system.

The Houdaille savings story is another outstanding example of the advantages in MOGUL-IZING – the *modern* method of water treatment technology.

SPECIALISTS IN INDUSTRIAL WATER TREATMENT FOR OVER 40 YEARS



Wheels and machines stay cleaner with emulsions of new S.E.C.O. Also, finishes are better.



Emulsions of new S.E.C.O. allow faster cuts with less tool wear.

Photos courtesy of
Peter Salmon Co., Glenside, Pa.

NEW EMULSIFYING OIL KEEPS MACHINES CLEAN, PROTECTS AGAINST RUST, GIVES IMPROVED HARD-WATER EMULSION STABILITY

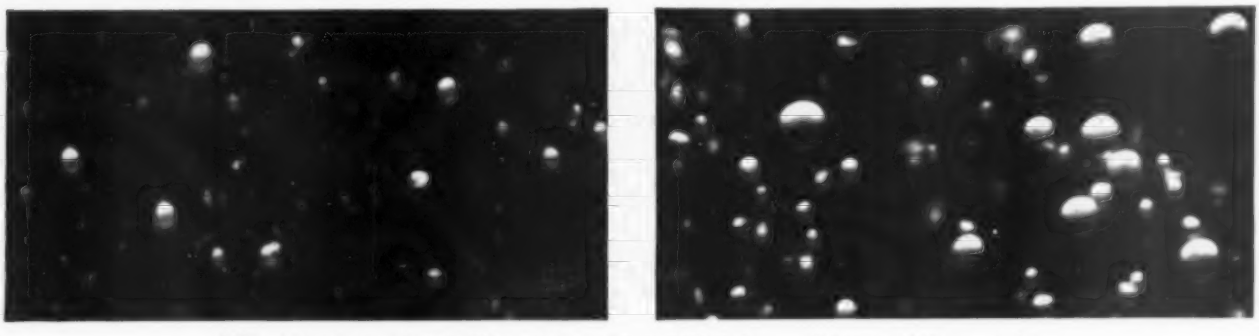
Emulsions of Sun's new S.E.C.O. (Sunoco® Emulsifying Cutting Oil) with smaller oil particle size give you the following benefits—

EMULSION STABILITY—In hard-water areas, impartial field tests show that emulsions of *new* S.E.C.O. stand up better under more severe conditions than those made with other regular emulsifying cutting oils.

DETERGENCY—The excellent wetting properties and detergency of *new* S.E.C.O. allow dirt and fines to settle quickly out of emulsions. Grinding wheels and machines stay cleaner.

RUST-PREVENTION—The smaller oil particle size in emulsions of *new* S.E.C.O. gives better metal wetting properties and increased protection against rust and corrosion. See photos below.

If you're a regular user of S.E.C.O., notice how much it has been improved. If you're not, find out what we mean about greater economy and improved production with *new* Sunoco Emulsifying Cutting Oil. Call your Sun representative, or write to Sun Oil Company, Philadelphia 3, Pa., Dept. I-9.



800x photomicrographs of 10% emulsions. *New* S.E.C.O. emulsion on left contains *8 times* as many oil particles per unit volume as ordinary emulsion on right. Many minute particles in S.E.C.O. emulsion do not show at this magnification.

SUNOCO®

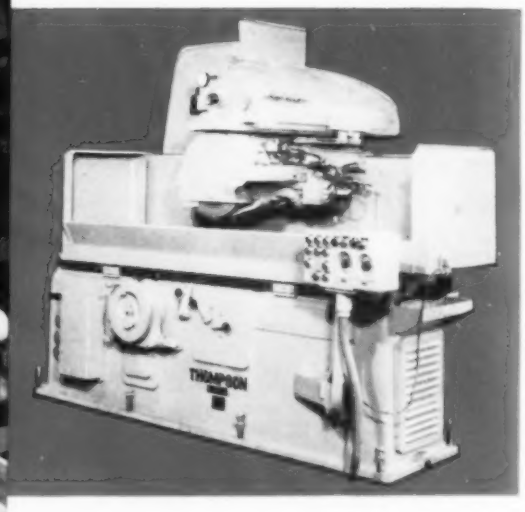
INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY Philadelphia 3, Pa.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

©Sun Oil Co., 1958

THE NEW THOMPSON PLUNGE-MATIC SURFACE GRINDER



COMPLETELY AUTOMATIC

With the new Plunge-Matic, Thompson now offers a plunge feed machine for those surface grinding jobs where the area to be ground is constantly covered by the grinding wheel width. Designed for fast production, the Plunge-Matic is completely automatic—including downfeed, wheel dressing and automatic compensation.

Shown above is one of four Plunge-Matics in use at the Disston Division, H. K. Porter Company, Inc., grinding high quality hand saws. The saws are held on tapered flux bars or magnetic shims and the wheel face is dressed straight with an automatic power operated wheel truing device. The four machines are equipped with a pre-selected variable downfeed arrangement which automatically decreases the downfeed rate as the contact area of the work increases. The wheel heads are also equipped with oscillating crossfeeds. Being completely automatic in their cycles, the four machines require but two operators who load and unload only.

Constant Accuracy is Assured by Hydra-Cool

All Thompson Plunge-Matics are made in various types and sizes to meet all job requirements. All machines of 40 inches and up in work length are equipped with the Hydra-Cool Hydraulic System*—the exclusive Thompson feature which eliminates all heat distortion throughout the machine.

* PAT. APPLIED FOR

The new Thompson Plunge-Matics are designed to grind contoured as well as flat surfaces with equal efficiency. The three drawings at right represent but three of many contour jobs which Thompson Plunge-Matics are now handling successfully.

Send for descriptive folder on this new Plunge-Matic surface grinder.

Thompson SURFACE GRINDERS

SPECIFICATIONS

GRINDERS:	Thompson Type C 12"x16"x-48" Plunge-Matics
WHEELHEAD:	40 HP
WHEEL:	20"x8"x12"
STOCK REMOVAL:	Approx. .010" from each side
PRODUCTION RATE:	60 saws every 50 minutes from 2 machines with one operator

THE THOMPSON GRINDER CO.

SPRINGFIELD, OHIO

"Keep Thompson in mind for that daily grind"

Chicago Pneumatic Tool Co.
Booth No. 1804

Cincinnati Milling Machine Co.
Booth No. 1555

Cities Service Petroleum, Inc.
Booth No. 108

Cleveland Grinding Machine Sales

Booth No. 838
Continuous lubricating system, timer belt, 110 v. electrical control, closer tolerance downfeed control, and other improvements are incorporated in new model VG-3 Visual Grind optical projection grinder.

Use postpaid card. Circle No. 48

Collins Microflat Co.
Booth No. 400
Lapped black granite surface plates. Minute reliefs on the plates, formed

by a lapping procedure, afford sufficient air pocket relief between bearing surfaces to prevent seizure of gage blocks. Plates are now lapped to 3-16 rms finish.

Use postpaid card. Circle No. 49

Elox Corp. of Mich.
Booth No. 935

Precision electrical discharge machines. Available in 3 sizes, the M-600 series incorporates the ruggedness of a die set, while retaining the precision demanded. Units can make dies as blanking, forging, extrusion, heading, or for air foil shapes and intricate-shaped holes.

Use postpaid card. Circle No. 50

Crystal Lake Grinders
Booth No. 1453

New model No. 816 universal grinder, equipped with Thymatrol power table feed, will be demonstrated. However, the model will not be equipped with the G. E. motor generator set as that is optional equipment for the machine. It has 8" swing, 16" center distances, ¾" collect capacity. Other new models are No. 1018 and No. 1020, power table feed. These grinders are equipped with the G. E. motor generator as standard equipment.

Use postpaid card. Circle No. 51

PROPER BOND IS NECESSARY

To reduce carbide cutting costs to a minimum, every Diamond particle must constantly have sharp angular faces exposed to the work piece. Pressure-lok bond controls each abrasive grain just as long as facets of that Diamond present sharp cutting edges. Pressure-lok uses uniformly graded Diamond (no fines) of warranteed density in the world's finest bond.

TOO SOFT: Soft bonds may wear too rapidly around the Diamond grain leaving them insufficient support and causing premature release. Contact with the work piece can tear Diamonds from too soft bedding before they have reached optimum performance.

TOO HARD: Hard bond can cause the bond line to recede too slowly not allowing Diamond grains enough exposure to give new cutting faces. This causes over-heating and loading of the wheel.

be SURE . . . get

PRESSURELOK®

HERE'S WHY PRESSURELOK WORKS BEST.

Pressurelok is the best of Diamond Wheels because it scientifically combines warranteed amounts of graded Diamonds distributed in constant density throughout a perfect bond which wears uniformly at the ideal rate of Diamond wear.

REMEMBER:

We've Never Failed To Deliver.

US **UNITED STATES DIAMOND WHEEL CO.**

835 ILLINOIS AVENUE AURORA, ILLINOIS

DALZEN

2 in 1 COMBINATION
CENTER GRINDER & DRILL PRESS

A drill press and center lapping machine at less than the cost of many single purpose center grinders! In addition to savings on equipment costs, the Dalzen "2 in 1" permits maximum man-hour production thereby keeping your unit cost at a minimum!

1 SIMPLE OPERATION CHANGES CENTER GRINDER TO DRILL PRESS

Center grinder to drill press or drill press to center grinder in a matter of seconds! Simply unlock clamping handle and swing diamond dresser in or out of position! Photo at left shows center grinder in dressing position. Photo above shows center grinder at work.

A full 43" capacity from base to spindle . . . dresser adjustment from 20° to 100° included angle . . . drills to center of 15" circle . . . maximum lapping stone dia. 3".

THREAD GRINDER

Average Set-Up Time 30 Minutes! Saves Floor Space! Low Cost!

Excellent for tool room and production Thread Grinding. Easily set-up from job to job! Has built-in relieving attachment as standard equipment for grinding of taps. This remarkable machine may also be used to grind angles, grooves and surfaces where concentricity is an important factor!

Dresser and wheel head are self-compensating. Size of work is automatically maintained after dressing of wheel regardless of how much is dressed off.

The grinding and regrinding of thread rolls up to 3" in diameter and thread milling cutters can also be ground with special attachment.

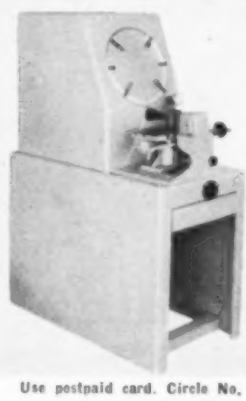
WE ALSO SPECIALIZE IN
THREAD ROLLING DIES AND THREAD HOBS
LITERATURE ON REQUEST

DALZEN MANUFACTURING CO.
4600 BREE ROAD, DEPT. GF-4
ST. CLAIR, MICHIGAN

ASTE Tool Show . . .

Covel Mfg. Co.
Booth No. 136

The No. 14 optical comparator has al measurements read directly from preci sion-built indicators. Optics are preci sion ground and coated. The object i always in direct magnification in rela tion to power lenses.



Use postpaid card. Circle No. 52

Arthur A. Crafts Co., Inc.
Booth No. 115

Crodian & Co.

Booth No. 1853

The Stace Model 41A precision air chuck has the magic air cap, which is a 1" by 1⅜" cap located on the large O.D. of the chuck. All needed to reverse the chucking direction is to remove four screws from the cap, rotate 180°, and replace the four screws. A wide variety of chuck jaws are available.

Use postpaid card. Circle No. 53

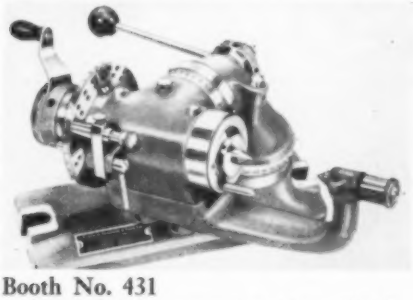
The Cushman Chuck Co.
Booth No. 1439

Davis Boring Tool Div. G. & L. Machine Tool Co.
Booth No. 1517

The DoAll Co.
Booth No. 604

The Model D6-1 surface grinder will demonstrate how to lower costs and eliminate scrap by reliance on hand wheel calibrations for dimensional control on applications, and do away with repeated grind and measure procedures according to the announcement.

Eastern Machine & Tool Co.

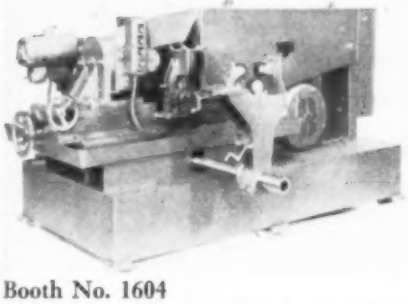


Booth No. 431

"All Tool" compound angle collet indexing and grinding fixture. Spindle runs concentric within .0002". Takes standard 5C Hardinge collets. Ideal for flat and cylindrical grinding, light milling, etc.

Use postpaid card. Circle No. 55

Engelberg Huller Co.



Booth No. 1604

Model 8132 centerless abrasive belt grinder is designed for precision grinding of rod or tube stock through-feed rates of from 4"-40' per min. Through-feed fixture accommodates stock from ½" to 6" in diameter.

Use postpaid card. Circle No. 56

Engis Equipment Co.

Booth No. 218

Featured are research, analytical and production inspection instruments for roundness, surface finish, straightness. Methods of deburring, filing, finishing and polishing of dies, molds, and tools generally. Pictured is Hyprez oscillating lapping machine.

Use postpaid card. Circle No. 57

Erickson Tool Co.

Booth No. 805

Esbec Barrel Finishing Corp.

Booth No. 954

The Esbec Vibra-Grader, dual function separating machine, will not only separate processed parts from media, but grades chips with great rapidity—up to two tons per hour, according to the announcement. Its two-decked screening arrangement will make three simultaneous separations.

Use postpaid card. Circle No. 58

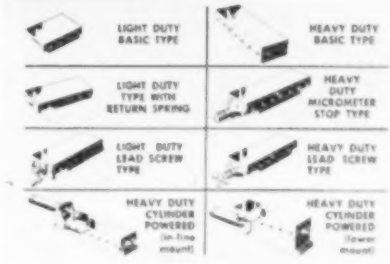
The Fellows Gear Shaper Co.

Booth No. 1820

Wm. H. Field Co., Inc.

Booth No. 962

Russell T. Gilman Inc.

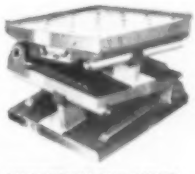

LIGHT DUTY BASIC TYPE
HEAVY DUTY BASIC TYPE
LIGHT DUTY TYPE WITH RETURN SPRING
HEAVY DUTY MICROMETER STOP TYPE
LIGHT DUTY LEAD SCREW TYPE
HEAVY DUTY LEAD SCREW TYPE
HEAVY DUTY CYLINDER POWERED
HEAVY DUTY CYLINDER POWERED

New!

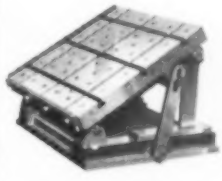
"MAGNA-SINE" WITH MAGNETIC TABLE

Robbins features for NEW SPEED, ACCURACY, SAVINGS . . . on every angular SET-UP!

These exclusive new features make Robbins angular tooling equipment *even more* valuable to every shop, large or small: (1) NEW O. S. Walker Multi-Pole Fine Division Permanent Magnet Chuck . . . the most powerful ever built! (2) NEW ribbing in base, intermediate and top plates for distortion-free strength and rigidity! (3) NEW "Perma-Flat" Swivel Block keeps gage blocks securely in place! (4) NEW full-length roll bar radius ground from solid for positive seating, greater accuracy! (5) NEW Robbins positive locking device! Add to these the proven Robbins design principle which makes setting up to machine, grind or inspect any angle a simple, four-step job that takes minutes instead of hours . . . and you see why every shop needs these tools. Free demonstration on your job.



INSPECTION AND LIGHT MACHINING SINE PLATE



HEAVY DUTY SINE PLATE FOR MACHINING

NEW! Catalog shows complete range of models and sizes. Write for your free copy.

OMER E. Robbins COMPANY
11961 DIXIE AVENUE DEPT. K DETROIT 39, MICH.

ON DISPLAY IN BOOTH NO. 1661, A.S.T.E. EXPOSITION, PHILADELPHIA

ASTE Tool Show . . .

Booth No. 1016

A variety of standard, stock components for building up equipment offered. 132 assembly models. Stroke lengths are from ¾" to 8", with slide working surfaces from 2x3" to 8x24".

Use postpaid card. Circle No. 59

Green Instrument Co., Inc.

Booth No. 1065

Gulf Oil Corp.

Booth No. 313

Hammond Machinery Builders Inc.

Booth No. 1704

The SCE-10 oscillator, with 10" dia. diamond wheel, has same two variables as SCE-6 model—both controlled by hand wheels. One is stroke length from

0 to 1½" for up to 2" tools. The other is stroke frequency from 0 to 115 per minute.

Use postpaid card. Circle No. 60

NEW! LARGER CAPACITY (6" WHEEL) PROFILE GRINDER by Boyar-Schultz

For Heavier and Larger Work

Long known as a time saver in Tool & Die Shops, Boyar-Schultz No. 2 Profile Grinder is now available in a new larger capacity size. With its 6-inch diameter wheel capacity this new Profile Grinder will finish large dies and other similar contour grinding with the rapid efficiency so well known in the smaller wheel capacity models. The new size is made in the Single Spindle model, with a bigger table to accommodate larger and heavier work. Also available with Standard Upper Spindle.

With Dual Spindle

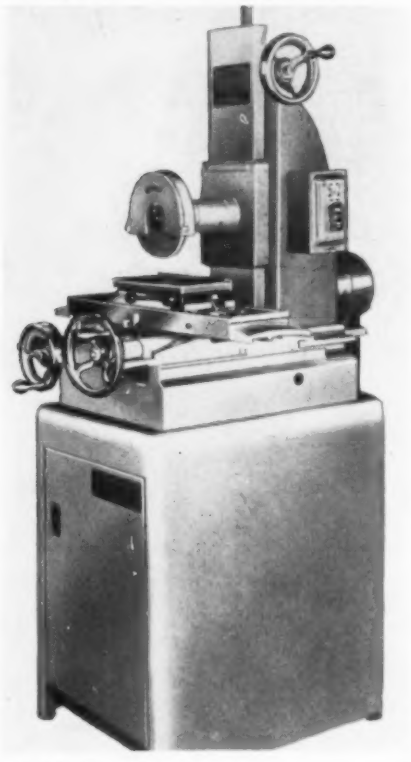
With Dust Collector

*'58

BOYAR-SCHULTZ CORPORATION

2002 South 25th Avenue, Dept. A-K • Broadview, Illinois

Harig Manufacturing Corp.



Booth No. 1027

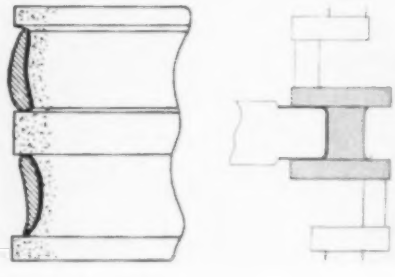
The 6x12 TML surface grinder features angular rack and pinion, combination V and flat ways, and optional equipment as motorized spindle, dust collector, and water unit.

Use postpaid card. Circle No. 61

Hofmann Engineering Co.

Booth No. 2042

Hoglund Engineering and Manufacturing Co.



Booth No. 1301

New contour dressing techniques for grinding wheels will be shown. Hydraulic, automatic wheels dressers, enabling .0002" tolerances on a multiplicity of contours, will be presented. Intricate contour jobs as dressing of grinding wheels for air foil lugs, axle spindles, etc., are now possible.

Use postpaid card. Circle No. 62

Homestrand, Inc.

Booth No. 729

Illinois Institute Technology

Booth No. 1850

Illinois Metal Products

Booth No. 1168

The Imp inner-groove micrometer measures and checks the depths of internal "0" ring, retaining ring, and

recess grooves to engineered specs. Two interchangeable anvils are furnished—one for the narrow retaining ring groove and a wider anvil for "0" ring grooves. Grooves can be measured in bores as small as 15/32" and to a depth of 2" from the face.

Use postpaid card. Circle No. 63

Industrial Diamond Assoc. of America

Booth No. 1840

All phases of the industrial diamond's contribution to tooling for competition within industry will be featured, with a million dollar diamond display. Diamond dressing & truing tools, grinding wheels & hones, saws, etc.

Use postpaid card. Circle No. 64

Ingersoll Milling Machine Co.

Booth No. 621

J & S Tool Co., Inc.

Booth No. 1501

Jarvis Corp.

Booth No. 1417

Jeon Manufacturing Co.

Booth No. 2054

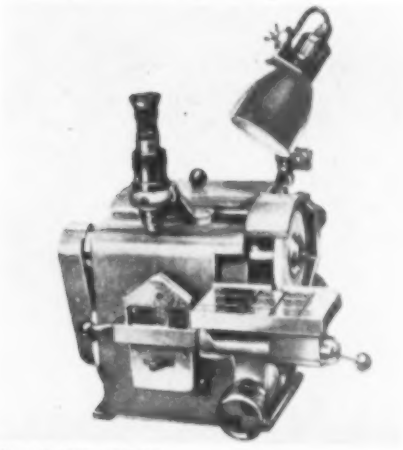
Model P-1 (pictured) automatic angle tangent to radius dresser. After dresser is preset to desired profile, profile will be dressed automatically in one continuous operation, eliminating any break in profile at points of tangency. A new Model P-2 dresses grinding wheels to 14" dia., the Model P-1 to 10" dia.

Use postpaid card. Circle No. 65

Jergens Tool Specialty Co.

Booth No. 1672

Jersey Manufacturing Co.



Booth No. 2154

On the Model SM-3 drill grinding machine, for drills 0.012" to 0.120", the drill is clamped into holder and checked under microscope. Shape of the holder is said to assure perfect sharpening of drill regardless of predetermined top angle, or whether right or left hand drills.

Use postpaid card. Circle No. 66

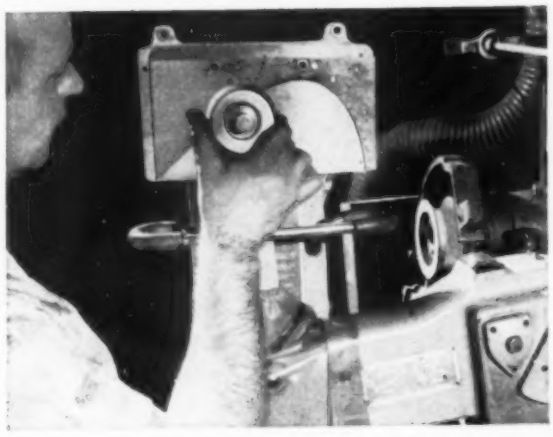
Jiffy Manufacturing Co.

Booth No. 2055

C. E. Johansson Gage Co.

Booth No. 418

"We Cut Form Grinding



COMPLEX GRINDING WHEEL FORMS ARE PRODUCED IN MINUTES . . . *by simply traversing the tracer lightly over an easily made template. A 10-to-1 ratio between template and truing diamond insures work accurate to "tenths."*

WRITE NOW FOR FREE PRODUCT LITERATURE . . . and see for yourself how a P&W Diaform Attachment can bring new speed, precision and economy to your form grinding operations. Just fill in and mail the handy coupon.

Time OVER 33% . . .

Using P&W Diaform Wheel Forming Attachments," says The B. JAHN Company.

Using Pratt & Whitney Diaform Wheel Forming Attachments, the B. Jahn Company, Inc. of New Britain, Conn. now form-trues grinding wheels—accurate to .0002" or better—*in minutes!* As a result, average time for producing the high-precision contoured punches and dies, which this company supplies to the aviation industry, has been cut 33%. Costs have been cut proportionately and busy machines released for other work. B. Jahn also likes the Diaform's *portability*, light weight, low initial cost and easy operation. As B. Jahn's chief engineer states, "We can take a man—and don't have to take our most experienced man—and in no time at all have him turning out precision work that is *better* than the old timers could *ever* do by other grinding methods."

PRATT & WHITNEY COMPANY
INCORPORATED
6 Charter Oak Boulevard, West Hartford 1, Connecticut

Please send my free copy of P&W Diaform Circular No. 543-3.

NAME _____ POSITION _____

COMPANY _____

CO. ADDRESS _____

CITY _____ ZONE ___ STATE _____

ASTE Tool Show . . .

The Mikrokator instruments, with adjustable pressure, are available with readings of .0001″ to .0000005″, and also with optional measuring pressure scale from 1 to 10 oz. or from 1 to 40 oz.

Use postpaid card. Circle No. 68

Jones & Lamson Machine Co.
Booth No. 1504

Precise measuring of heavy parts, double spindle construction (to minimize deflections), increased capacity and measuring ranges are features of heavy-duty 30″ comparator. Dia. capacities are from 0″ to 8″.

Use postpaid card. Circle No. 69

Kalamazoo Tank & Silo Co.
Booth No. 525

Landis Machine Co.
Booth No. 1538

Lassy Tool Co.
Booth No. 1159

M-B Products Inc.
Booth No. 1459

Here's your spindle ready for reassembly. New super precision bearings from our complete stock of all types of spindle bearings are installed. We've cleaned and checked every part of this spindle for misalignment and flaws—It's ready to go back together for a series of exacting "run-in" tests to make certain the dirty, worn out spindle we received just hours ago is returned to you ready to perform as well or better than it did when the spindle was new!

Gentlemen:

I'd like to have complete information on your spindle repair service.

Name .....

Firm .....

Address .....

City..... Zone..... State.....

BEARINGS, INC.

3640 EUCLID AVENUE • CLEVELAND 15, OHIO

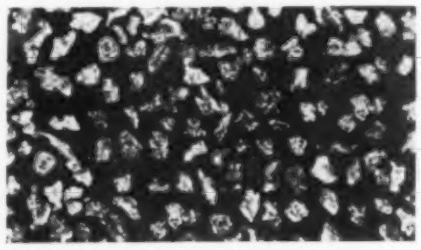
OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Mansfield • Toledo • Youngstown • Zanesville
INDIANA: Ft. Wayne • Indianapolis • Muncie • Terre Haute
PENNSYLVANIA: Erie • Johnstown • Philadelphia • Pittsburgh • York
WEST VIRGINIA: Charleston • Huntington • Wheeling
NEW JERSEY: Camden • MARYLAND: Baltimore
DELAWARE: Wilmington •
Subsidiaries: Balanced Corp. • Buffalo, N.Y.•

Maserati Corp. of America
Booth No. 1320

Master Chemical Corp.
Booth No. 1329

Master Manufacturing Co.
Booth No. 1316

Metallurgical Products Dept., General Electric Co.



Booth No. 1435

Produced by the manufacturer, man-made industrial diamonds are used in the sharpening of carbide cutting tools for machining parts. Precision machining of AISI 52100 steel, using carboloy grade 0-30 cemented oxide will be featured at exhibit.

Use postpaid card. Circle No. 70

Micrometrical Manufacturing Co.
Booth No. 223

Profilometer Group II, measures more than 85% of all varied surfaces produced by industry. The LJ tracer measures on ID's as small as ¼″, OD's as small as ⅛″ flats, tapers, and narrow splines. The mototrace provides a steady tracing motion of 0.3″ per second over lengths from 1/16″ to 2-3/4″.

The amplimeter shows arithmetical or r.m.s. average roughness height, as selected by switch on panel.

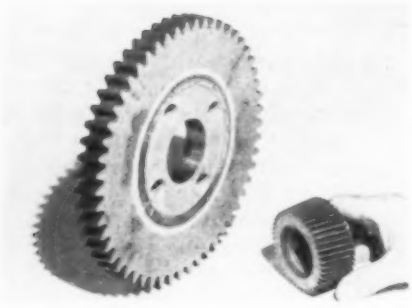
Use postpaid card. Circle No. 71

Micro-Poise Eng'g Sales
Booth No. 114

Moore Special Tool Co., Inc.
Booth No. 1249

National Broach & Machine Co.
Booth No. 922

A variety of Red Ring gear tooth honing tools (pictured), for performing hard-gear tooth finishing operations on



spur or helical external and internal gears, will be displayed.

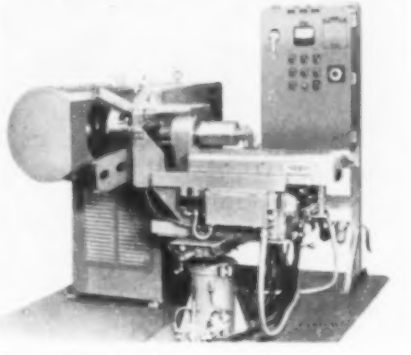
Use postpaid card. Circle No. 72

Nelco Tool Co., Inc.
Booth No. 126

Newage Industries Inc.
Booth No. 2104

New Hermes Engraving Mach.
Booth No. 964

The Osborn Manufacturing Co.



Booth No. 1434

The Brushamatic 3A-M automatic machine is used to deburr, edge blend, and surface finish parts as gears, pinions, etc. It has advantage of high production output said to be about 600 units per hour.

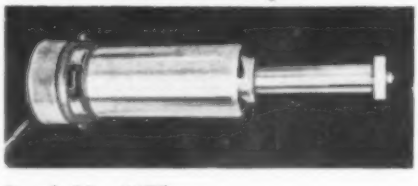
Use postpaid card. Circle No. 73

Portman Instrument Co., Inc.
Booth No. 434

The optical comparator has a large 18" diameter screen. The duplex design permits use as vertical model, or horizontal. Lenses provide magnifications of 10X, 20X, 25X, 31¼X, 50X, 62½X, and 100X.

Use postpaid card. Circle No. 74

Precise Products Corp.



Booth No. 1155

Precise Super 80 power quill, with new spindle extension for deep grinding and finishing castings and dies, is one of the new power quill models to be displayed. The extension spindle can be adapted to any power quill without loss of torque, speed, or precision. The cutting tool shank is held rigidly in the spindle casing by ball bearings.

Use postpaid card. Circle No. 75

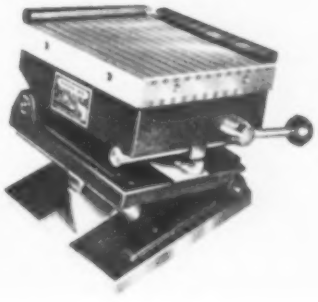
Production Machine Co.
Booth No. 1811

Reed Roller Bit Co., Cleco Air Tool Div.
Booth No. 1871

The new 1500 series pneumatic air grinders offer compact, lightweight construction, and ease of operation. Thumb-tip throttle provides control, and a special muffler handle reduces noise.

Use postpaid card. Circle No. 76

Omer E. Robbins Co.



For the finishing touch that means so much!

From the smooth feel of perfectly polished stainless steel tableware to the contoured grips on modern power tools, Jewel Brand Coated Abrasives are bringing fast, efficient grinding, smoothing and polishing to the manufacture of hundreds of products. Because *end products cost less when you finish with Jewel Brand Abrasives*, it will pay you to bring their many advantages to bear on your finishing problems. Order now from your Industrial Distributor or write for specific recommendations.

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COATED ABRASIVES

Belts • Rolls • Sheets • Discs • Specialties

ABRASIVE PRODUCTS, INC.

South Braintree 85, Massachusetts

ASTE Tool Show . . .

Booth No. 1661

The Magna-Sine magnetic sine plate features an improved locking device, a perma-flat swivel block, ribbing on plates for strength, and a new O. S. Walker multi-pole fine division permanent magnet chuck.

Use postpaid card. Circle No. 77

The Rotor Tool Co.

Booth No. 1832

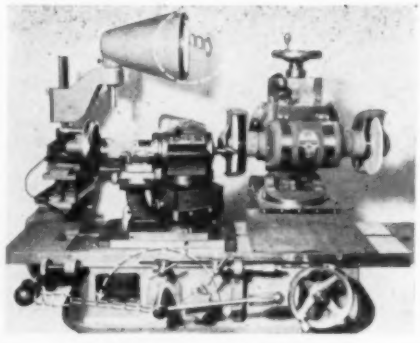
Rotor belt sander, for 2" and 1" wide belts, features twin interchangeable air motors, both governed for proper cutting speed. Included are adjustments for best application of belts.

Use postpaid card. Circle No. 78

Royal Master Inc.

Booth No. 1953

Royal Oak Tool & Machine Co.



Booth No. 519

The R-O universal form relieving fixture and grinder with optical comparator will be featured. Comparator swings from out-of-the-way position, bringing lens over work and projects the ground profile, with 20 to 1 magnification, on 8" dia. glass. Shown is comparator swung out of position, and work moving into wheel.

Use postpaid card. Circle No. 79

Joseph T. Ryerson & Son, Inc.

Booth No. 1036

George Scherr Co. Inc.

Booth No. 445

The new model micro projector has a 4" dia. horizontal stage on which to lay flat work, and a 14" dia. inclined screen on which the enlarged image is reproduced. Different projection lenses can be slipped into vertical socket.

Use postpaid card. Circle No. 80

Scully-Jones and Co.

Booth No. 1635

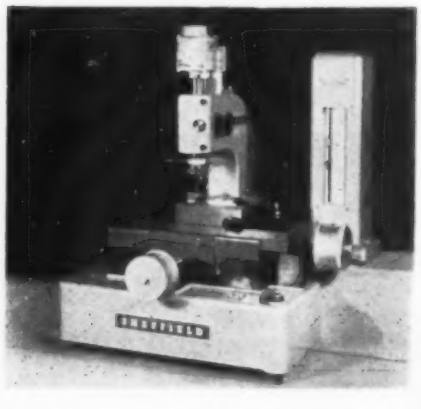
Sealol Corp.

Booth No. 130

The Sheffield Corporation

Booth No. 222

The Precisionaire Hole Coordinate Measuring Machine is said to check hole centerdistance or location fast, easily and precisely. The true location



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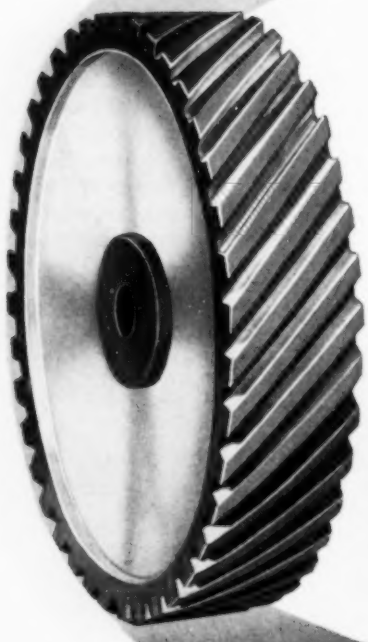
Contact Wheel



NEW R-57 Eliminates VIBRATION RUNS SMOOTHER

Automatically aligns. New R-57A. Rubber Arbor Hole Hub draws up tightly on spindle even when worn spindles are used . . . Eliminates Vibration . . . Low Operating Noise . . . Maximum efficiency of wheel, belt and machine.

ADDED R-57 FEATURES:

Durable Rubber Tire and Hub vulcanized to steel discs. Proper serrations for smooth action. Lightweight, maximum safety. Available in plain or serrated faces in all durometers, for every grinding and finishing operation.

Write today for complete information and prices.

CHICAGO RUBBER COMPANY, INC.

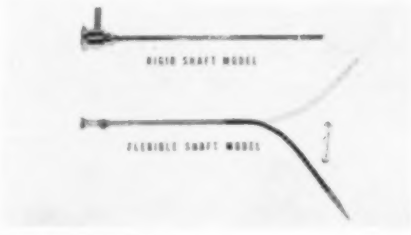
660 Market Street • Waukegan, Illinois

of holes is indicated irrespective of diameter tolerances. Two models are available.

Use postpaid card. Circle No. 82

Simonds Abrasive Co.
Booth No. 312

Size Control Co.



Booth No. 405

A high-precision optical inspection instrument, the Bore-O-Scope, gives a clear view forward, retrospectively, right angularly, or forobliquely. In sizes 3/16" O.D. and up; lengths from 8" to 15'.

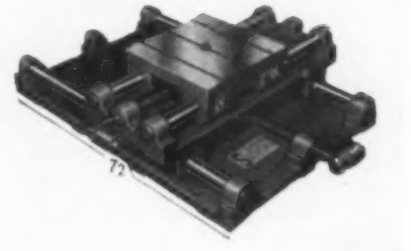
Use postpaid card. Circle No. 83

Socony Mobil Oil Co., Inc.
Booth No. 1339

Spiral Step Tool Co.
Booth No. 1475

Spitfire Tool Co.
Booth No. 1638

The Standard Electrical Tool Co.



Booth No. 946

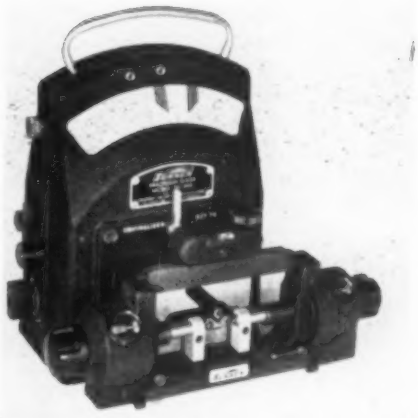
An operating, functional display of a two-dimensional ball bushing positioning table, operating in conjunction with a tape-control unit will highlight the "Build-It-Yourself," "Building Block" theme. The demonstration will be a complete cycle of operation, including reading of prints, the typing of tapes, reading of tapes, and final operation of table, and machining as dictated by tape.

Use postpaid card. Circle No. 84

Stone Machinery Co., Inc.
Booth No. 545

Sunnen Products Co.
Booth No. 1438

The new PG-800 precision gage and PG-400 size setting fixture combination, for measuring internal diameters, measures without use of ring gages,



gage blocks, etc. It is reported to show absolute size to fraction of a "tenth." Range from 3/8"-1½" dia.

Use postpaid card. Circle No. 85

Sun Oil Co.
Booth No. 640

Super-Cut, Inc.
Booth No. 1849

Superior Hone Corporation

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FREE "VISUAL GRIND" BOOKLET SOLVES YOUR PROBLEMS: IMPORTANT TO YOU. Free booklet tells how VISUAL GRIND facilitates contour grinding of carbide or steel, punch and die sections, dies for powder metallurgy, lamination dies and special purpose dies. VISUAL GRIND permits through, blind and templet grinding . . . permits continuous inspection by magnifying work from 10:1 to 100:1 . . . upgrades semi-skilled labor . . . permits easy maintenance of dies in your own plant . . . reduces costly down time. VISUAL GRIND COMPLETES YOUR TOOL ROOM.

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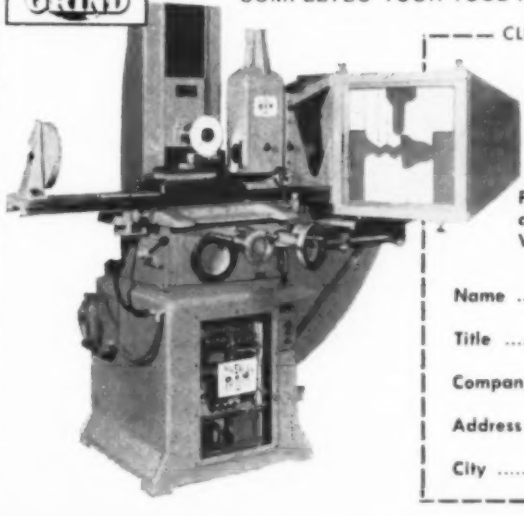

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"PRESSURE-SET"
Oriented
DIAMOND DRESSER

to meet your
Specific Needs

Whether you use single or multi-stone settings . . . in unipoint, spade-type or profile dressers . . . you'll find PRESTALLOY offers you a complete, immediate selection of clean-cutting, long wearing tools. And only PRESTALLOY gives you the established advantages of "Pressure-Set" mounting . . . an exclusive diamond-anchoring method that insures maximum dressing speed and efficiency! In addition to the regular PRESTALLOY line (a few of which are shown below), our flexible production facilities enable us to quickly produce for you non-standard and special wheel dressing tools to meet your exact specifications. Let us quote on your requirements.

Write for your copy of the new PRESTALLOY catalog and price list.

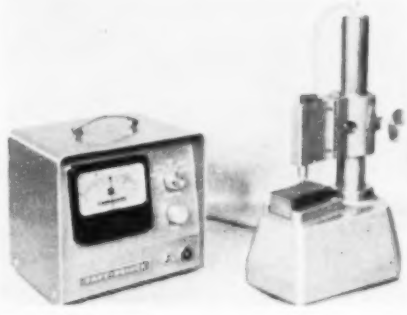
DIAMOND PRODUCTS, INC.
333 Prospect St • Elyria, Ohio
Dealerships available in some areas

ASTE Tool Show . . .

Booth No. 1670
The Model HM honing machine is said to reduce honing time and produce more parts per set of stones. Hydraulically operated, it claims to maintain constant cutting pressure at all times. Dial shows part coming into size.

Use postpaid card. Circle No. 86

The Taft-Peirce Mfg. Co.



Booth No. 219
The Versachek, an electronically operated gage, converts minute dimensional variations to voltage changes and amplifies them on a large meter. Gaging is based on comparison of product dimensions to suitable masters. Magnifications of 400:1, 2,000:1, 4,000:1, 20,000:1 provided.

Use postpaid card. Circle No. 87

The Texas Co.
Booth No. 2019

Thor Power Tool Co.
Booth No. 1845

Torit Mfg. Co.
Booth No. 1349
An average of 30% of carats from diamond grinding operations is said to be recovered by diamond collector. It

operates on an exclusive centrifugal separating principle that eliminates filters.

Use postpaid card. Circle No. 88

United States Rubber Mechanical Goods Div.
Booth No. 1233

U.S. Tool Co., Inc.
Booth No. 1554

The Van Keuren Co.
Booth No. 419
Flatness of precision parts with reflective surfaces can now be tested accurately with the reflex interference viewer. Errors of too-close and off-axis viewing are eliminated.

Use postpaid card. Circle No. 89

The Vulcan Tool Co.
Booth No. 1404

O. S. Walker Company, Inc.

Booth No. 1947
The 10" wide and 15" long permanent magnetic machine chuck, No. 1015, is said to hold large or very thin parts with complete security on any part of the chuck face. When lever is at "off" position, the work is released and completely demagnetized.

Use postpaid card. Circle No. 90

Wilson Mechanical Instrument Div., American Chain & Cable Co.
Booth No. 309
Testers as following to be exhibited: Combination normal and superficial unit, TwinTester; Size 3 fully automatic feed and discharge floor model; motorized Model Y units; hand-operated Rockwell testers; Rockwell Superficial tester, etc.

Use postpaid card. Circle No. 91

REPRINTS AVAILABLE

Grinding and Finishing in Chrysler's Torque-Flite Transmission Plant
By Jack Kenyon

Organizing and Operating a Precision Barrel Finishing Department
by Morris S. Shipley
and William A. Biebel

Centerless Grinding
by G & F Editorial Staff ..... $ .35

Developing Standard Time Data for Grinding Operations
by E. A. Cyrol $1.00

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There is a precision-engineered Chicago Mounted Wheel or point for every imaginable grinding operation. Ideal for efficient, effective deburring. . . . Always available . . . in all standard sizes, and over 200 special shapes, for out-of-stock delivery. Save Time – Money – Materials . . . Specify Chicago Mounted Wheels!

Every Chicago Mounted Wheel is produced under positive production control . . . assuring perfect uniformity of mounted wheels and points. There is no variation from one production run to another.

Positive density control for peak job performance

Guaranteed to stay on the mandrel . . . perfectly balanced

Chicago Mounted Wheels are easily dressed and hold their shape

Unlimited number of combinations of dimension, shape, grain, size and bond

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Send me two sample Chicago Mounted Wheels without charge:

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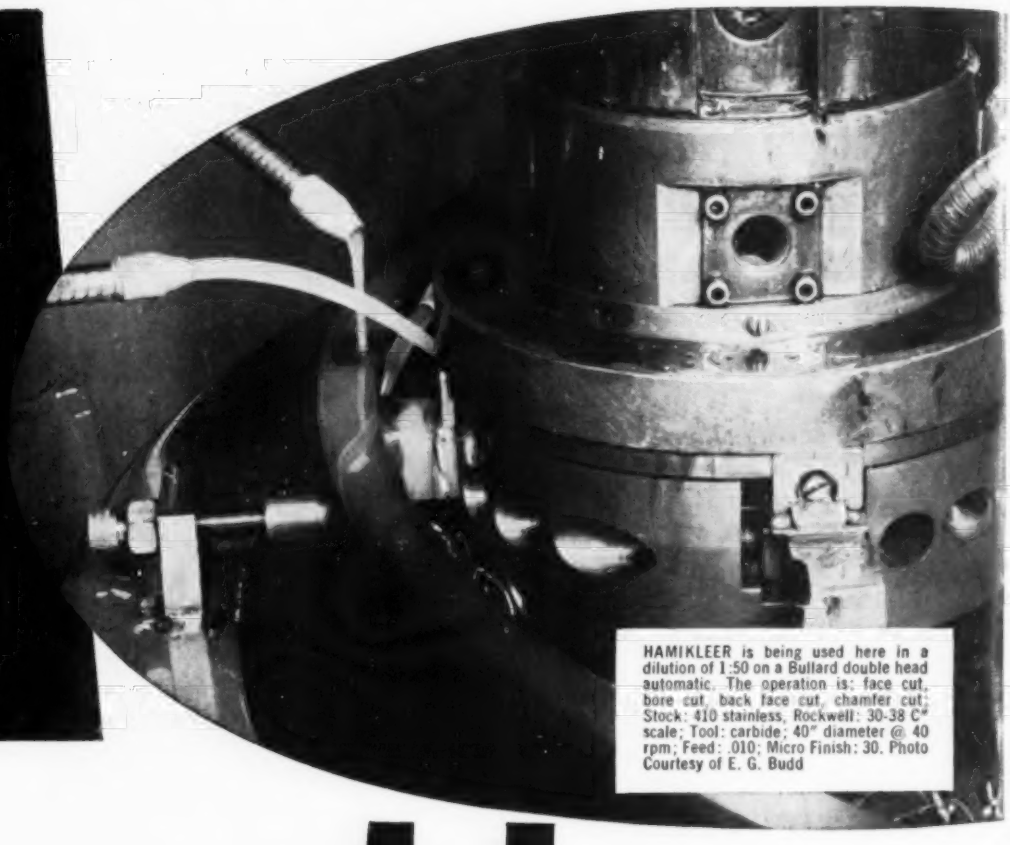
the first oil-free water soluble coolant!



HAMIKLEER is being used here in a dilution of 1:50 on a Bullard double head automatic. The operation is: face cut, bore cut, back face cut, chamfer cut; Stock: 410 stainless, Rockwell: 30-38 C" scale; Tool: carbide; 40" diameter @ 40 rpm; Feed: .010; Micro Finish: 30. Photo Courtesy of E. G. Budd

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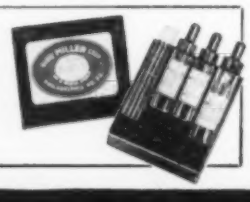
offers more outstanding metalworking benefits

Replace soluble oils with HAMIKLEER and you'll get many more outstanding benefits. This *oilless* coolant:

- **Outlasts soluble oil emulsions by five times.**
- **Prevents rust** eliminating the need for and cost of cleaning operations.
- **Requires less expensive make up** since only water is added to the solution.
- **Will not affect workers' skin, turn rancid or foam** saving operators' time.
- **Permits gauging while the machine operates,** saving shutdowns.
- **Provides finer surface finishes, longer tool life** eliminating rejects.
- **Lowers inventory costs** since it can be used on many different metalworking operations.
- **Eliminates costly disposal problems.** It will not pollute streams if oils are kept out of the mixture.

HAMIKLEER mixes with any water to form true clear solutions. These solutions can be made more dilute than is practical for ordinary soluble oils and they are more efficient at the longest range dilution . . . as proved by years of experience in plants throughout the country. Write for a free sample to test on your own metalworking operations.

This free test kit is sent to all HAMIKLEER users. It permits operators to test dilution right at the machine, *saving considerable time.*



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grinding and finishing

Free Literature

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Electrolytic Carbide Tool Grinders

Both chip breaker and cup wheel grinders are described in catalog No. 255, as well as new vises and grinding fixtures for fast regrinding or throw-aways and inserts.

Combined with the Anocut process, Hammond electrolytic grinders are said to provide a tremendous advance in grinding ease, speed, and cost reduction. Tool cracking is eliminated due to the coolness of the electrochemical action while grinding.

Hammond Machinery Builders, Inc., 1651 Douglas Ave., Kalamazoo, Mich.

Use postpaid card. Circle No. 1

Automatic Angle Tangent to Radius Dresser

Model P-1 automatic angle tangent to radius dresser is defined in leaflet. After the dresser is preset to the desired profile (composed of angles and radius), the desired profile is said to be dressed automatically in one continuous operation, eliminating any break in the profile at the points of tangency. It is reported fully universal.

A new Model P-2 dresses grinding wheels to 14" dia., the Model P-1 to 10" dia.

Jeon Manufacturing Co., P.O. Box 6750, Washington 20, D.C.

Use postpaid card. Circle No. 2

Gage Blocks

Shop-blocks are the grade A gage blocks described in new, illustrated catalog sheet. These blocks are reported accurate to within +.000006" —.000002" of nominal sizes. Even the machinist and toolmaker, as well as the inspectors, can now work to gage block tolerances. This is said to eliminate the costly errors due to inaccurate instruments.

Full information is given including specifications, set sizes, accessories available, and prices.

The DoAll Co., Des Plaines, Ill.

Use postpaid card. Circle No. 3

Toolroom Grinding Wheels

Brochure No. PG-350 entitled, "Cincinnati Toolroom Grinding Wheels," describes and pictures the many features and applications of these wheels for both general toolroom and cutter and tool grinding. It also contains a complete table of starting grades for a wide range of toolroom grinding operations.

Cincinnati Milling Products Div., Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

Use postpaid card. Circle No. 4

Attention! TOOLMAKERS-GAUGE MAKERS!
AT LAST! THE DRESSER THAT DOESN'T STOP AT THE POINT OF TANGENCY
ELIMINATING THE BREAKS
THAT OCCUR WHEN YOU STOP!
JEON
Automatic Angle Tangent to Radius

MICRO MILLING CUTS PRODUCTION TIME 31½ HOURS . . .
INCREASES TOOL LIFE 300%

SUPER-SPEED POWER QUILL

Sizing an aluminum cavity to .001" tolerance on a die for a rotary process machine at R. P. Scherer Ltd., Windsor, Ontario, was a simple operation for a PRECISE Super 80 POWER QUILL. This Super-Speed POWER QUILL—mounted on a standard machine tool—not only held the prescribed tolerance but cut production time 31⅓ hours and increased tool life 300% over previous machining methods.

PRECISE Super-Speed POWER QUILLS meet every production and toolroom requirement and are quickly mounted with PRECISE mounts on standard and special machine tools. They mill or grind the hardest alloy steel, soft plastic, wood and rubber, aluminum, Masonite and even glass. Their superhigh speeds, high torque, spindle and chuck rigidity permit the use of the hardest cutting tools for faster stock removal, improved surface finishes, maximum tool life, and the maintenance of tolerances to .0001". Adjustable spindle speeds range from 15000 rpm to 45000 rpm with power ratings up to 1½ hp from ordinary 110v or 220v power supplies.

Mail coupon below for complete information on the entire line of PRECISE Super-Speed MICRO TOOLS.

PRECISE PRODUCTS CORPORATION, Racine, Wisconsin, U. S. A.
Branch Plant: Precise, G. m. b. H., Duesseldorf, Germany

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Rotary Cutting Tools · Vapor-Lub Cooling Systems

PRECISE PRODUCTS CORPORATION, 3735 Blue River Road, Racine, Wisconsin
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Also send data on Precise ☐ Cutting Tools, ☐ Vapor-Lub Cooling.

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Company_____

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See us in Booth 1155—ASTE Show

FREE LITERATURE *continued*

Ceramics

A technical bulletin on stabilized Crystolon ceramics describes the physical properties of three new engineering materials: Crystolon "N" (nitride bonded), Crystolon "R" (recrystalized or self-bonded), and Crystolon "C" (a coating).

The ceramics high resistance to thermal shock and extreme temperatures, some as high as 4000° F. All three are being used in the rocket motor field. They are reported to include resistance to wear and chemical attack, and certain electrical properties which vary with the three, but are useful in many applications.

New Products Dept., Norton Co., Worcester 6, Mass.

Use postpaid card, Circle No. 5

Snagging Wheels

Snagging covers a wide field of grinding operations in foundries, steel mills, and metal fabricating plants as discussed in snagging handbook available. Each machine demands a certain grinding wheel specification to produce faster, more economical results.

The importance of the kind of abrasive, size of the abrasive grains, type and amount of bond holding abrasive grains together in a grinding wheel is stressed. A standard wheel marking chart is given, as well as diagrams of standard shapes of snagging wheels. Proper handling of grinding wheels is discussed, with rules for grinding wheel safety.

Peninsular Grinding Wheel Div., 729 Meldrum Ave., Detroit 7, Mich.

Use postpaid card, Circle No. 6

Rubberized Abrasives

Industrial catalog tells what Cratex rubberized abrasives are, how they are used, and what they can do on a broad

CRATEX Rubberized Abrasives
FOR DEBURRING • SMOOTHING • CLEANING • POLISHING
WHEELS • POINTS • BLOCKS • STICKS • CONES
The World's Finest Rubberized Abrasives for Industrial Use

list of high precision manufacturing operations on tools, dies, molds, instruments, models, and component parts. Included are advanced application information, operating instructions, tables, illustrations, and technical information.

Cratex Manufacturing Co., 1600 Rollins Rd., Burlingame, Calif.

Use postpaid card. Circle No. 7

Diamond Dust Collector

A four-page booklet describes how a prominent automotive manufacturer recovered $100 cash in reclaimed diamond dust for every $1,000 he spent on diamond grinding wheels. The diamond collectors, which cost no more than an average diamond wheel, paid for themselves in 21 operating days, the manufacturer points out.

The diamond dust collector operates on a centrifugal separating principle, depositing the diamond-laden "swarf" in a clear, plastic container. It is adaptable to mist, wick, or dry grinding.

Torit Manufacturing Co., Walnut & Exchange Sts., St. Paul, Minn.

Use postpaid card. Circle No. 8

1958 Manufacturers' Agents' Guide

This Guide, which lists more than 10,000 manufacturers who distribute their products through manufacturers' agents, has been prepared as an answer to frequent requests by "reps" who seek to expand their present lines. The directory is classified by industry and provides a comprehensive listing of manufacturers and their addresses. It includes information on their principal products, estimated credit rating, and the name and title of the sales executive.

As an additional aid to manufacturers' agents, the Guide details steps to follow in communicating with manufacturers, suggests commission scales for various products, typical clauses to consider in a manufacturer—manufacturers' agent contract and provide data on operations as an agent.

The new directory consists of 150 pages, is 8½ x 11 in size, attractively bound and designed for facility. The price is $10.00, and it is sold on a ten-day unconditional money back guarantee basis.

Manufacturers' Agent Publishing Co., 505 Fifth Ave., New York 17, N. Y.

Use postpaid card. Circle No. 9

Diamond Grinding Tools

Catalog 52 B from Sample Marshall Labs, Inc., 63 Park Ave., Lyndhurst, N.J., describes the firm's line of diamond wheels and tools and other diamond products. The 11-page catalog explains their method of bonding (electro-formed nickel bond); diamond helixing wheels, cutoff wheels, slotting wheels, contour wheels, cup wheels, mounted wheels; diamond countersinks, core drills, files, hones, reamers, plated flexolap, and special wear parts and wheel dressers. Each product is illustrated with description of application; specification drawings are shown. Recommended catalog for those with unusual diamond wheel applications.

Use postpaid card. Circle No. 10

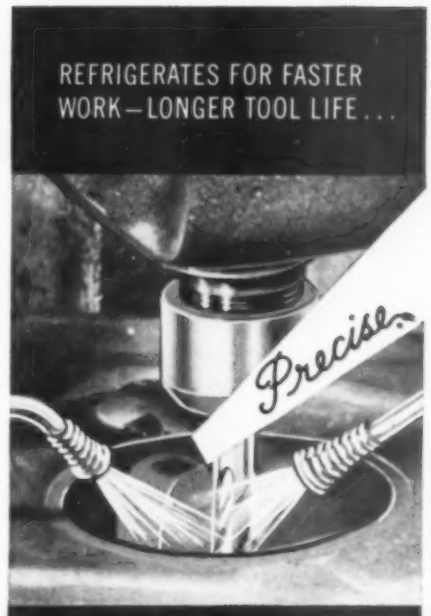
Limit Switches

Small-size, two circuit limit switches are reported to have the capacity to handle electrical loads usually assigned to much larger switches. Actuator versions covered are: the roller arm, flush-mounted roller arm, low force rod, flexible coilspring, in-line plunger, and roller-plunger.

Rated electrically at 10 amperes, 120, 240 or 480 vac, the roller-arm type, for example, measures less than 5" in height.

Micro-Switch, Freeport, Ill.

Use postpaid card. Circle No. 11



VAPOR-LUB COOLING

Unlike liquid coolant systems, PRECISE Vapor-Lub refrigerates and lubricates the entire cutting area for maximum cutting efficiency. By sudden expansion of compressed air through a precision nozzle, the entire cutting area temperature is reduced up to 20 F below room temperature. In addition, an atomized coolant spray is deposited on tool and work to lubricate and minimize frictional heat for increased tool life, faster work, improved surfaces, and maintenance of closer tolerances.

Vapor-Lub cooling is clean . . . simple . . . and economical...requires no special plumbing or coolant pans . . . can be installed in seconds on any machine. Available with single or multiple jet nozzles for every cooling requirement. Single unit $47.50; double unit (shown) $69.50.

Send coupon for complete information.

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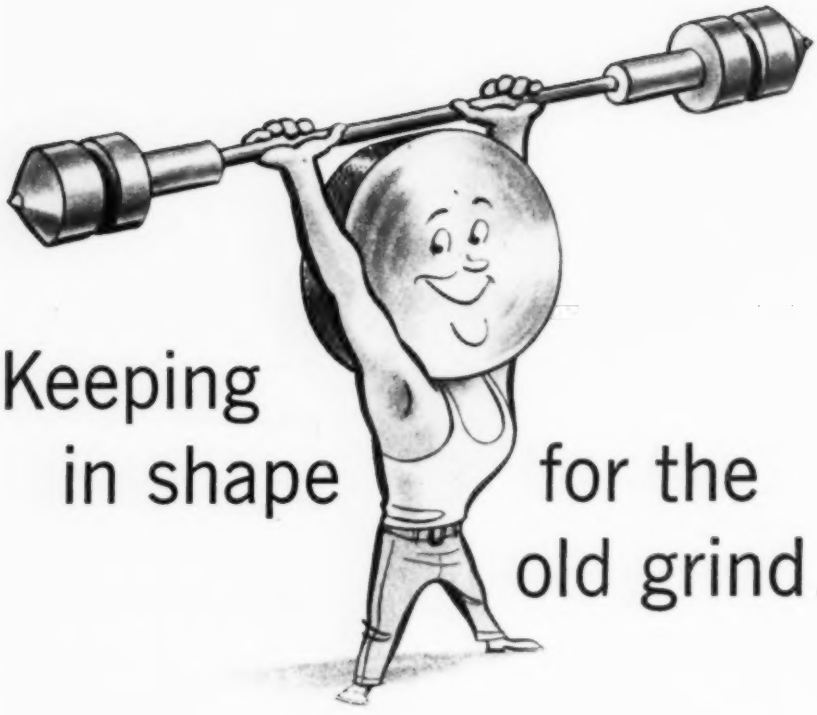

Keeping in shape for the old grind...

For more than seventy years, J. K. Smit has grown with industry, by helping industry to grow.

As abrasives were improved, and became a vital part of manufacturing, J. K. Smit developed the materials and techniques necessary to make the tools to true and dress abrasive wheels.

Today, J. K. Smit produces quality diamond tools for trueing, dressing, and contouring every type of abrasive wheel ...For doing the jobs too tough to be done economically by anything but industrial diamonds.

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J. K. Smit & Sons, Inc.
MURRAY HILL, NEW JERSEY
DETROIT, MICH.

FREE LITERATURE *continued*

Package for Measuring Surface Roughness

Profilometer Group II, with mototrace, amplimeter, and the new type LJ tracer, as described in leaflet available, measures more than 85% of all the varied surfaces produced by industry.

The tracer, with single-skid skid-mount shown, measures on ID's as small as ¼"—OD's as small as ⅛"—flats, tapers, narrow splines. The type V mototrace provides a smooth, steady tracing motion of 0.3" per second over lengths from 1/16" to 2¾". The type QA amplimeter shows arithmetical or rms average roughness height, as selected by switch on panel. It has six ranges —zero to 3, 10, 30, 100, 300, and 1000 microinches.

Micrometrical Manufacturing Co., 345 South Main St., Ann Arbor, Mich.

Use postpaid card. Circle No. 12

Heavy Duty V-Belt

A four-page color bulletin No. M210 describes a Condor LS V-belt made for long center, heavy duty drives. The belt features a precision proportioned construction reported to eliminate V-belt whip and turn-over that leads to belt failure. It is moisture-proof vacuum packaged in aluminum-lined bags.

Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N.J.

Use postpaid card. Circle No. 13

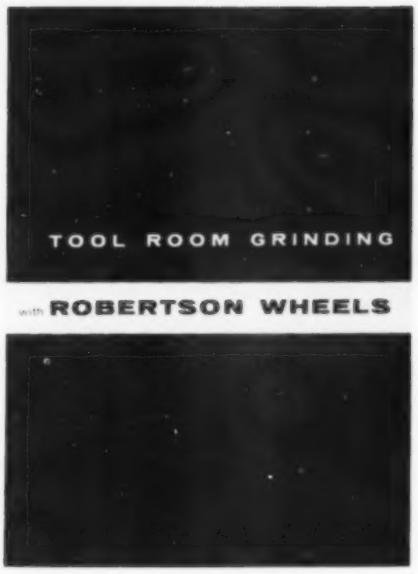
Flat Surface Disc Grinders

A 24-page catalog, CG-58, describes and illustrates flat surface disc grinders, abrasive discs, and cylinder wheels. It illustrates the basic types of disc grinders, work carrying fixtures, variety of shapes and sizes of workpieces ground, automation in disc grinding, and the range of sizes and types of faces of abrasive discs.

Gardner Machine Co., Beloit, Wis.

Use postpaid card. Circle No. 14

Grinding Wheels



"Tool Room Grinding with Robertson Wheels" is the title of bulletin available. It is illustrated with views of tool room operations, contains tables of wheel types, sizes and markings applicable for high speed steel cutter and drill sharpening; vertical spindle, rotary table and reciprocating table surface grinding, etc.

Robertson Manufacturing Co., P.O. Box 848, Trenton 5, N.J.

Use postpaid card. Circle No. 15

Machine Table Vises

American Society of Tool Engineers data sheets No. 34-93150 obtainable give complete specifications and dimensions of universal 3-way machine vises, universal rotary tables, adjustable lathe fixtures, plain and swivel base machine vises, adjustable angle plates, and mill table vises.

Universal Vise and Tool Co., Parma, Mich.

Use postpaid card. Circle No. 16

Color Code Kit

A color code kit, in 17 colors, supplies materials and information necessary to design a successful color coding system. Color coding is used in plants where steel bars, rods, etc., are used in quantity, and where identification of crates, boxes, or products in-process is desirable.

Paint is by simple spray application from aerosol spray cans. This paint is said to stick even over oily or greasy surfaces, and will not change color or fade.

The kit is available without cost from Crown Industrial Products Co., 1001 Amsterdam St., Woodstock, Ill.

Use postpaid card. Circle No. 17

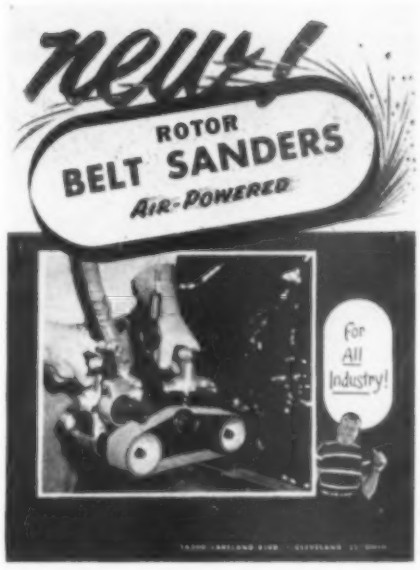
Air-Powered Belt Sanders

Rotor belt sander, for 2" and 1" wide belts, features twin interchangeable air motors, both governed for proper cutting speed, according to leaflet obtainable. There is reserve power for all types of contour and flat work.

Included are adjustments for proper and best application of belts, i.e., motor alignment adjustment, belt tracking adjustment, and belt tension adjustment.

The Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, Ohio.

Use postpaid card. Circle No. 18



Automatic Holding Power Control

ASSURES TOP MAGNETIC CHUCK PERFORMANCE

NEUTROLATOR

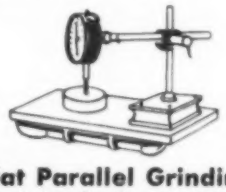
No More Shimming!

Electro Magnetic Chuck Control provides regulation of holding power which permits grinding without shimming, to closer flat parallelism than ever before possible.

In production grinding where holding power must be the same with each work piece, NEUTROLATOR produces the same tension on each successive piece without readjustment.

Where various tensions are required, a simple dial or pushbutton controls holding power adjustment.

NEUTROLATOR affords complete control of electro magnetic chuck at all times and protects chuck from harmful voltage surges.



Flat Parallel Grinding

Where absolute Flat Parallel grinding is a necessity, NEUTROLATOR should be considered a necessity.

Easy Removal of Work!

When work is completed, NEUTROLATOR demagnetizes both chuck and work piece. No resistance—no marred work or chuck surfaces.

Contact Your Equipment Supplier or Write:

ELECTRO-MATIC PRODUCTS CO.

2237 N. KNOX AVENUE CHICAGO 39, ILLINOIS

TELEPHONE: BELMONT 5-4010

FREE LITERATURE *continued*

NEW...
push-pull rapid action!
WILTON DRILL PRESS VISES
combine free sliding action with positive screw action... automatically!
6 models - also with conventional solid nut
WILTON

Drill Press and Machine Vise

Described in recent catalog No. 691 are a completely new drill press vise, and the latest design improvements in Wilton's MilOmatic air-hydraulic vise, now coming into use as an automatic production fixture. They are reported to provide instant, automatic clamping action, and be adaptable to a variety of jobs with low cost jaw inserts.

The drill press vises, in six models, are designed made to provide huge jaw capacity. They are machined top, bottom, and sides for accurate 90° hole drilling without a fixture. Heavy duty machine vises are also included.

Wilton Tool Mfg. Co., Inc., Schiller Park, Ill.

Use postpaid card. Circle No. 19

Diamond Wheel

Practical information on diamond wheels and grinding techniques is presented in the 32-page catalog-manual, "Clipper Diamond Wheels."

The catalog covers an outstanding selection of grinding wheel types, with sectional drawings, dimensions, diamond concentrations, general characteristics of different bonds, do's and don'ts with diamond wheels, proper selection of types, wheel markings, etc. A graphic index facilitates turning to the page of the selected type.

Clipper Diamond Tool Co., Inc., 345 Hudson St., New York 14, N. Y.

Use postpaid card. Circle No. 20

Tool Lapping

Methods of finishing and refinishing carbide cutting tools and inserts are described and illustrated in a booklet. The technique presented is based upon the use of Hyprez diamond compounds with a tool finishing machine equipped with meehanite lapping wheels that oscillate while they rotate. This method quickly produces a micro, scratch-free finish with geometric accuracy.

Hyprez Div., Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.

Use postpaid card. Circle No. 21

Tap Chamfer Grinder

Bulletin No. 557 reports on the tap chamfer grinder as salvaging expensive taps and giving a bonus of thousands of extra tapped holes. It sharpens RH and LH taps with 2, 3, 4, 5, 6, 8, and 10 flutes, and sharpens the lead on reamers, countersinks, three- and four-flute drills.

This unit, when teamed with the flute grinder, is said to make possible an unusual system for precison sharpening of taps, correcting errors in indexing and controlling rake angle.

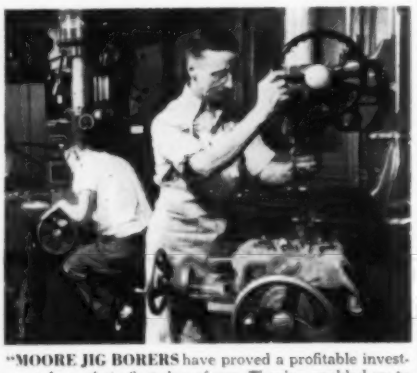
Edward Blake Co., Inc., 437 Cherry St., West Newton 65, Mass.

Use postpaid card. Circle No. 22

Willis Ehrhardt tells how Moore Jig Borers and Jig Grinders built nation-wide service

This is another in a series featuring the views of owners of leading contract tool and die companies

by **WILLIS G. EHRHARDT**
Managing Partner
Ehrhardt Tool & Machine Company
St. Louis, Mo.
Specialist in High-Precision Gages and Dies



"MOORE JIG BORERS have proved a profitable investment from their first day of use. They've enabled us to spot, drill, ream and bore, at higher precisions, and faster, than any previous equipment. Carbide die work seems to be their 'cup of tea'."

"*'A nation-wide service for the few who want the most in precision dies, tools and gages.'* That's what we claim; that's what we do. And the backbone of the facilities which enable us to provide this service, is our Moore Jig Grinding and Jig Boring equipment.

"We were the first contract tool and die company in our area to install these versatile machine tools years ago, and we've added the new models promptly. In addition to helping us maintain the highest precision standards, their very flexibility of application brings in a caliber of work which is often beyond the scope of toolrooms and of competition.

"We are quite proud, for example, of an *all-ground die*, machined entirely on the Moore Jig Grinder, in *hours*. Formerly, we could not have tackled its complex contours and holes. Equally intricate operations have been performed by our Moore Jig Borers.

"Beyond a doubt, the speed, ease of operation and high-precision of our Moore equipment for holes, contours and surfaces are prime factors in keeping us 'first on the Mississippi'."

Can Moore equipment cut costs in *your* toolroom? Moore shows you the way—with literature describing the features of these machines and how they can be used to your profit. For copies, just write...

MOORE SPECIAL TOOL COMPANY, INC.
725 Union Avenue, Bridgeport 7, Connecticut

HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts the modern way. 424 pages, 495 illustrations. $5 in U.S.A., $6 elsewhere.

"OUR MOORE JIG GRINDER has established a record of trouble-free performance absolutely unmatched... especially remarkable in view of the many 'trick' operations it is called upon to handle."

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JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

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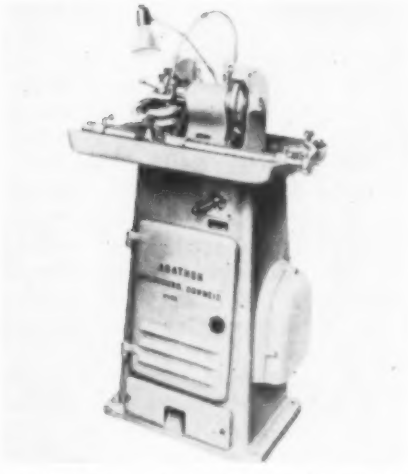
Grinding and Finishing

New Equipment and Materials

For further information on any of the products listed here, use the handy postpaid card opposite page 80.

Economy Size Carbide Tool Grinder



With one setting, the Agathon 150A is said to perform difficult tool-grinding operations with no time lost in angle checking during working. It permits secure tool clamping and micrometer adjustments.

Special attachments are available for grinding chip breakers, special tools, single and double toothed cutters, and many other precision applications. The grinder is especially designed for grinding carbide turning tools for Swiss type automatics, turret automatics, copy lathes, and precision toolroom lathes.

Spec.: Recommended speed of spindle, 3000 rpm; dia. of 6″ for grinding wheels.

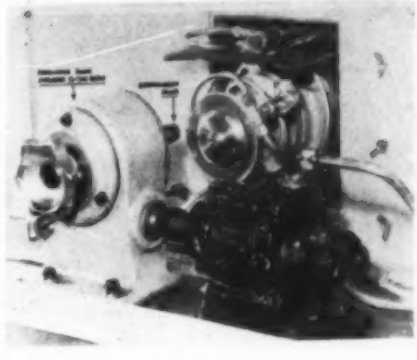
Carl Hirschmann Co., Inc., Manhasset, N.Y.

Use postpaid card. Circle No. 101

Slicing Machine Meters Fluid for Smooth Travel

A germanium slicing machine is innovated around the manufacturer's 824 surface grinder with hydraulically operated table. Feeds as fine as 1/64″ per min. can be obtained, and cutting speed varies from 1/64″ per min. to 4″ per min. with the rapid transfer return being 6′ per min. The slicer will slice slugs up to 2″ in dia. and up to 6″ in length.

A new principle in metering of hydraulic fluid has been used to obtain smooth travel which is needed for slicing brittle germanium or silicon. The 1 hp spindle motor can be varied between 5,000 and 20,000 rpm infinitely with the use of variable frequency. The rotating holder is driven by a fluid motor which can be varied infinitely to give slug speeds of 5 to 120 rpm. The cross feed is operated electrically and can be varied infinitely between .011 and .075″ with a repeatable accuracy within ±.0005″. If greater accuracy than this is desired, the manufacturer can supply it.

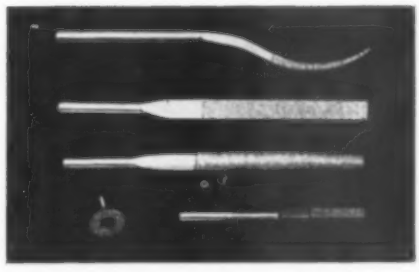


Reid Brothers Co., Inc., 140 Elliott, Beverly, Mass.

Use postpaid card. Circle No. 102

Diamond Files Feature New Riffler

Rifflers, together with straight diamond files in numerous shapes, provide fast, economical cutting action, and can be operated at high speeds and temperatures, according to the announcement.



The riffle, file coated, with 90 micron diamond particles, is available in four shapes (cross-sections). The diamond particles are accurately graded and permanently bonded in chrome deposit on a hardened steel core.

Hyprez Div., Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill.

Use postpaid card. Circle No. 103

Coated Abrasive Wheel Polishes Contours, Flats

A flap wheel, designed for polishing and finishing contoured and flat metal surfaces, is made up of hundreds of pieces of coated abrasive cloth, with stiffened construction which gives pressure resistance.

Wheel sizes are from 6″ x 1″ up to 16″ x 6″.

Behr-Manning Co., Troy, N.Y.

Use postpaid card. Circle No. 104

Magnetic Broom

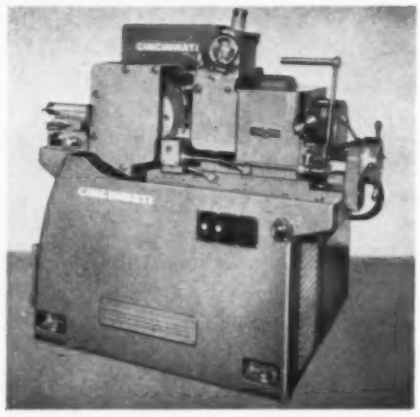
The rotary magnetic broom utilizes a permanent, rotating-cylinder magnet. It picks up nails, screws, nuts, bolts, scraps, chips, etc., thus assuring cleaner work areas and improved safety conditions.

The scrap is released for disposal by means of a neoprene unloading ring.

Magnetool Div., Multifinish Mfg. Co., 26341 W. Eight Mile Rd., Detroit 19, Mich.

Use postpaid card. Circle No. 105

Grinding Machine Handles Precision Work to 1½" Dia.



The No. 1 Filmatic centerless grinding machine, rated at 7½ hp for the grinding wheel drive, features Filmatic bearings for the grinding wheel spindle. These bearings, consisting of three segments, automatically adjust for load and are reported to eliminate spindle flutter.

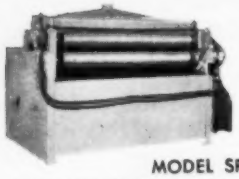
The machine handles infeed and thrufeed work up to 1½" dia., and can be equipped for continuous automatic operation. Attachments and accessories include infeed and thrufeed work rests and blades, crush truing, profile truing, grinding wheel positioning, and others.

Cincinnati Grinders, Inc., Cincinnati 9, Ohio.

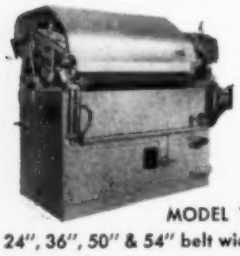
Use postpaid card. Circle No. 106

TIMESAVER SPEEDBELT* ABRASIVE MACHINES

*Trade Mark



MODEL SPL
24", 36" & 50" belt widths



MODEL TOP
24", 36", 50" & 54" belt widths

Both Models of the Timesaver "Speedbelt" Abrasive Machine can be used in tandem for automatic polishing of tops and bottoms of material being processed . . . in one operation.

Mechanize polishing of aluminum, stainless steel and other metal sheets, bars and blanks — perforated or solid

TIMESAVER *SPEEDBELT* Abrasive Machines are the fastest and easiest machines to set-up for production polishing schedules on the market today. Abrasive belts with grit range from 40 to 220 can be changed in 5 minutes or less. Adjustment for stock thickness can be made in seconds. Feed speed is variable from 35 to 80 SFM with lower or higher speeds optional In addition to polishing, Timesaver Machines are used for metal finishing and deburring operations.

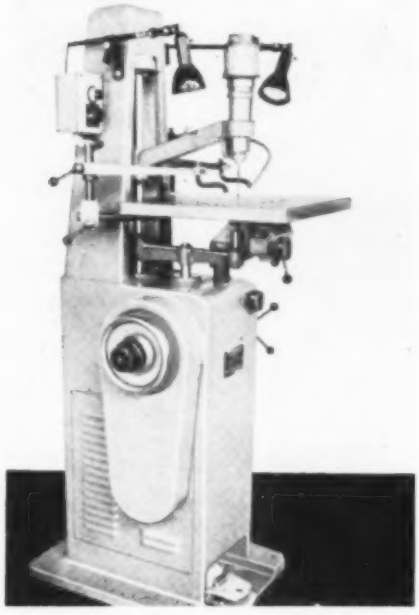
Write Today . . . send for the on-the-job story of Timesaver Machines polishing metal grilles and folder describing in detail all the Timesaver features, construction and specifications.

TIMESAVER SANDERS
P.O. BOX 7446 • ROBBINSDALE STATION
MINNEAPOLIS 22, MINNESOTA

A SIGHT GAGE which has greatly simplified the task of sharpening gundrills has been devised. It makes possible the sharpening of drills without the use of expensive instruments, according to the announcement. In checking gundrill sharpened tip, as pictured, if light shows between tip and gauge impression, sharpening is required. Eldorado Tool and Mfg. Corp., 336 Boston Post Rd., Milford, Conn.

Use postpaid card. Circle No. 107

Toolmaking Machine



The Roto Recipro toolmaking machine has been developed as a new approach to machining hardened dies and tungsten carbides. In extrusion dies especially, the toolmaking machining method is said to be utilized to great advantage.

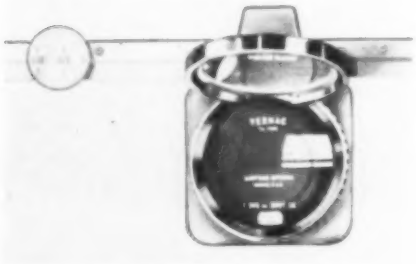
The most important feature of the machine is the ability to machine intricate carbide contours using inexpensive diamond Roto Recipro tools or diamond Recipro shape tools. Its many uses include machining punches, trim dies, tension filing, carbides, and extrusion dies.

Model F-4 is pictured.

Connecticut Tool & Engineering Co., Round Hill Rd., Fairfield, Conn.

Use postpaid card. Circle No. 108

VERNAC DIRECT READING OPTICAL VERNIER has a hardened stainless steel precision scale graduated in 0.025 numbered intervals (encircled upper left) which is affixed to the machine tool table. Scale readings are projected onto back illuminated dial face (shown at center right of vernier). Dial graduations on double spiral reticle are in 0.0001 intervals on back illuminated area (bottom

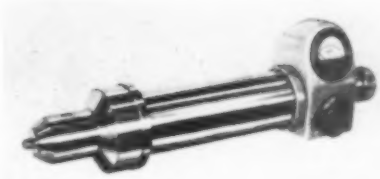


center of unit). Mirrored dial cover above vernier can be rotated and angled to permit dial reading from various operating positions at the machine. Accuracy is claimed to be constant because it has no moving parts. Two units are said to convert a relatively inexpensive milling machine to perform operations to tolerances formerly possible only with costly equipment. Simpson Optical Mfg. Co., 3200 W. Carroll Ave., Chicago 24, Ill.

Use postpaid card. Circle No. 109

High Speed Grinding Spindle

A high speed grinding spindle, the Swedish UVA turbo-head, has a spindle speed range of 60,000 to 100,000 rpm, infinitely variable. It has an electric tachometer and automatic reaction valve



control of air supply, torque and rpm for peak performance.

Homestrand, Inc., Larchmont, N.Y.

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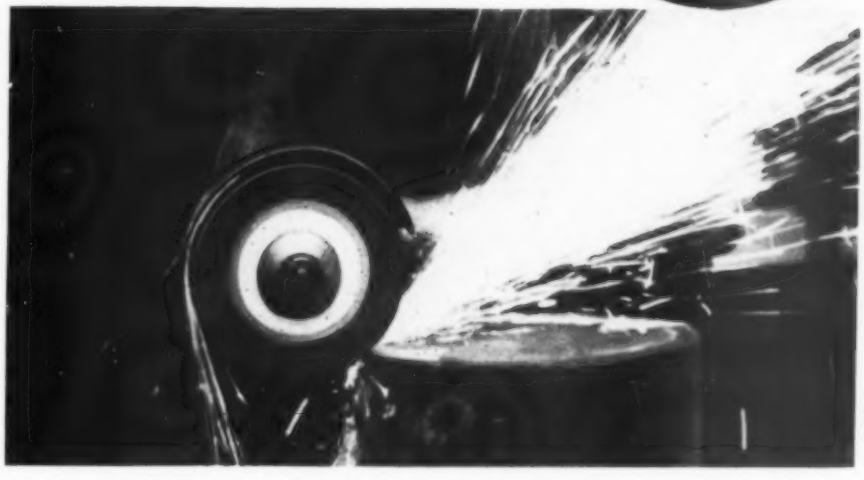
ATLANTIC WHEELS

cut work fatigue to a man-saving minimum!



Ask the men who use them — Atlantic Grinding Wheels have a smooth, floating action that requires less grinding pressure, keeps operators fresher for longer periods throughout the daily work schedule. Even where metal removal is roughest, you can count on Atlantic Wheels for fast, cool, clean-cutting performance . . . depend on their rugged resinoid bond for maximum on-the-job safety.

A trial run in your plant will quickly prove their worth in money-saving terms. Have an Atlantic representative recommend the right wheel for your specific requirements. Meanwhile, write for your free copy of the Atlantic Grinding Wheel Catalog. Atlantic Abrasive Corp., 532 Pearl Street, South Braintree, Massachusetts.

Atlantic Abrasive Corp.

A DIVISION OF ABRASIVE PRODUCTS, INC.

South Braintree 85, Massachusetts

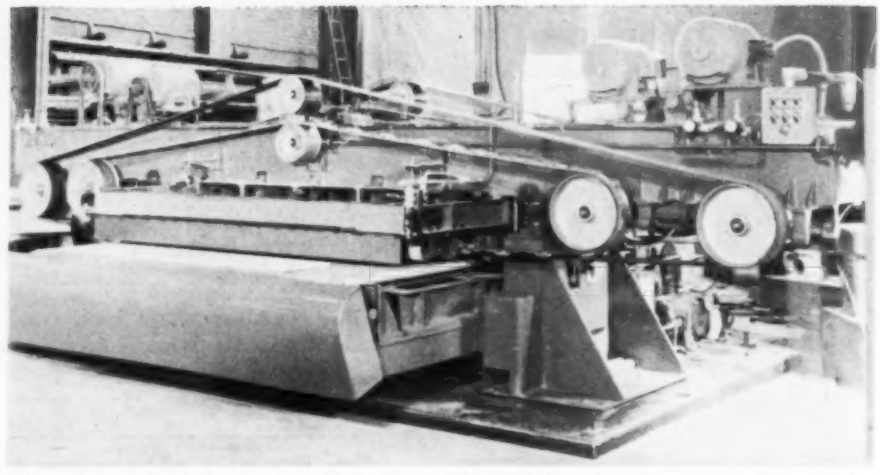
STRAIGHT WHEELS • CYLINDER WHEELS • CUP WHEELS

CONES • PLUGS • MOUNTED WHEELS AND POINTS

A long scratch pattern is produced by a straight line polishing machine, using the flat belt polishing principle. The polisher for panel sanding, called the Curtis Smooth-Matic, has the potential of automating the belt polishing operation.

The Model 1000A-DB-8′ with a 30″ minimum width capacity, designed primarily for plywood and wallboard, is a double belt roll feed polisher that incorporates powered pinch rolls for feeding sheets or panels through a two-grit sequence. The second model, 1000C-DB-8′, the conveyorized version, is capable of handling stock as narrow as 1″ wide, making it ideal for use in the furniture industry.

Polisher Has Good Platen Action for Better Sanding



Model No. 1000C-DB-8′ polishing machine will be shown in operation at the AWME Show, May 13-17, 1958, in Winston-Salem, N. C.

The polisher automatically measures the width of each panel and will sand various size panels as they are intermittently fed through the machine. Automatic raising of the platen prevents damage to panel being processed through, and is ready for the sanding pressure on the next panel.

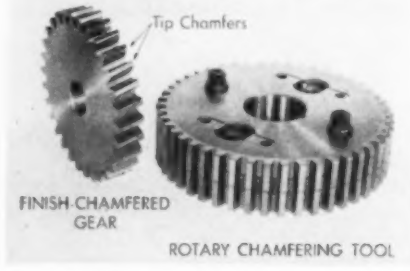
The Curtis Machine Div., The Carborundum Co., Jamestown, N.Y.

Use postpaid card. Circle No. 111

Process Produces Profile-Blended or Straight Chamfers

A Red Ring process making use of a specially-designed rotary chamfering tool, mounted on the cutter spindle of a conventional rotary gear shaving machine in mesh with the gear to be chamfered, produces profile-blended or straight precision chamfers on tips of gear teeth, according to the announcement. The process can be applied to any type of spur or helical gear teeth. The chamfering operation is performed by reciprocating and rotating the tool while feeding it to tight-mesh depth.

The chamfering tool assembly is made in a variety of sizes having curved or angular-shaped tooth forms made to generate a specific profile-blended or straight chamfer on the tips of the teeth.



The chamfering tool is assembled within a split guide gear.

National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

Use postpaid card. Circle No. 112

RIBON UNIVERSAL GRINDERS

Electro mechanical and hydraulic models produced by one of Europe's largest grinder manufacturers—completely universal with swinging internal grinding heads. 14" x 2" x 5" O.D. wheel with 3 H.P. and 18000 and 35000 I.D. spindles with 1½ H.P. Long conical adjustable plain bearings in both wheelhead and workhead with automatic pressure oil bath lubrication. All machines have automatic table traverse and infeeds.

11" x 20" Electro Mechanical Grinder $3600.00
11" x 32" Electro Mechanical Grinder $3775.00
11" x 42" Electro Mechanical Grinder $3950.00
Automatic Cycling Plunge Cut ...$650.00 addtional

All Prices FOB N.Y. or Chicago

LOW COST GRINDERS

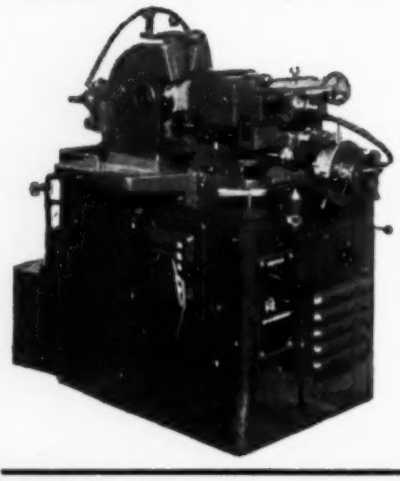
Write for Catalog

CENTRI CENTERLESS GRINDERS

Close tolerance production units capable of .0001" tolerances in production. Long conical adjustable plain bearings on both grinding wheel and feed wheel spindles with pressure oil bath lubrication. Equipped for bar feed, thru feed, and infeed work with automatic ejectors and automatic cycling on infeed where desired. Diamond or crush dressing on both wheels with contour form and taper dressing of wheels by either hand feed screw or hydraulically.

Model 0—Work Dia. .020"-½". 10 x 2¼" x 5" Wheel with 3 H.P. $2250 00
Model 1—Work Dia. .020"-2". 12 x 4 x 5" Wheel with 5 or 7½ H.P. $3450.00
Model 3—Work Dia. .030"-3". 14 x 7 x 5" Wheel with 16 H.P. $5750.00

All Prices FOB N.Y. or Chicago

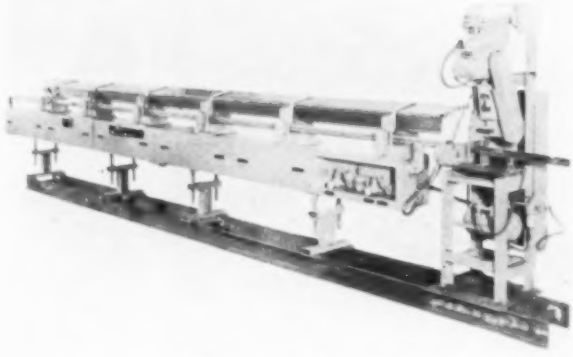


ASTE Booth No. 1307
Philadelphia May 1-8

Southwestern Metal Exposition, Booth No. 569. Dallas May 12-16

THE AMERICAN HERFORDER CORP.
1801 W. COLUMBIA AVE. CHICAGO, ILLINOIS

Automatically Fed Swing Cut-Off Machine



Clamping is done by air as the operator swings the cutting head into cutting position on the automatically fed swing cut-off machine. The machine makes possible the storing of material and having it automatically feed stopped clamped.

The set-up shown was used to cut ⅝" O.D. x .062 wall tube x 22¾" long. The actual part-to-part or floor-to-floor time was 2.4 seconds per piece for ten pieces.

Either ferrous materials, cut with abrasives, or nonferrous materials, cut with metal wheel and mist coolant system, may be worked with the unit.

Wallace Supplies Mfg. Co., 1300 Diversey Parkway, Chicago 14, Ill.

Use postpaid card. Circle No. 113

Centerless Grinding and Finishing Machine

The Type 486 precision machine is built to machine tool tolerances, and employs abrasive belts running over a hardened steel contact roll as cutting medium. The feeding unit is also an abrasive belt with flat platen which permits center line contact with workpiece at any feeding angle. These features are said to eliminate the need for periodic dressing of grinding or regulating wheels.

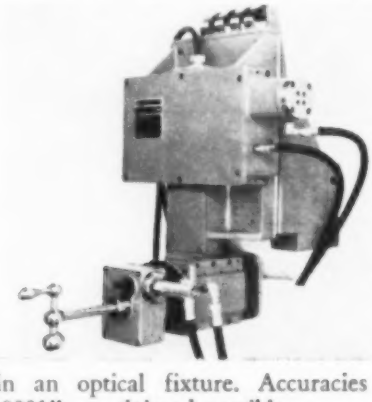
The machine will handle bar stock up to 1" diameter, and tubing up to 3" diameter, any length.

Production Machine Co., Greenfield, Mass.

Use postpaid card. Circle No. 114

Wheel Dressers Have Automatic Hydraulic Operation

The Model 93 and Model 95 hydraulic contour wheel dressers feature automatic hydraulic operation. Contours are produced by reduction of a contour template through an inclined plane mechanism. Dressing diamonds are pre-set



in an optical fixture. Accuracies to .0001" are claimed possible.

They are available for left and right-handed installations on cylindrical grinders.

Hoglund Engineering & Mfg. Co., 343 Snyder Ave., Berkeley Hts., N.J.

Use postpaid card. Circle No. 115

"Building Block" Switches Provide Easy Installation

A series of modular-mount lighted pushbutton switches, known as Series 100PB, bring new styling and ease of installation to panels, and mount end-to-end in rectangular slots.

Between the switches and on each end of a row, brushed-aluminum barriers hold the switches in the panel and separate the buttons. This feature prevents accidental dual actuations.

Switch assemblies are available in three models—a light-force, a positive touch-feedback, and an alternate-action design.

Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Phila. 44, Pa.

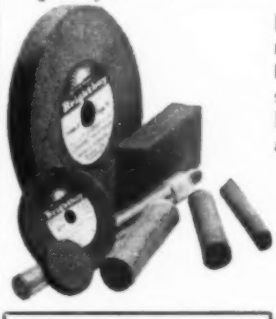
Use postpaid card. Circle No. 116

It's what's IN these wheels
That brings OUT big, new time-savings

(abrasive plus RUBBER!)

A COMPLETELY NEW SLANT ON ABRASIVE APPLICATIONS

Multi-Use Brightboy gives you *a definitely different working action*, with *abrasive and rubber functioning simultaneously*. Brightboy often reduces BURRING, CLEANING, FINISHING and POLISHING to a single step, time saving operation. A Brightboy finish frequently constitutes the final polish.



Write for FREE SAMPLE BRIGHTBOY HAND PIECE for quick-job cleaning

Readily-available Brightboy STOCK numbers are JOB-MATCHED not only to your usual finishing work, but also to special finishing, often replacing special-order compounds. Wide selection of Silicon Carbide and Aluminum Oxide grains. Each in grades from extra fine to extra coarse, in soft, firm and tough rubber binders.

Made in WHEELS, STICKS, RODS & BLOCKS *for machine and manual applications.* Ask your dealer to recommend the Brightboy numbers for your needs, and for the Brightboy catalog listing applications and machine speeds. Ask him or write us for "Notes From The Brightboy Service Engineer," an informal news letter describing Brightboy applications reported by our service engineers.

BRIGHTBOY INDUSTRIAL DIVISION
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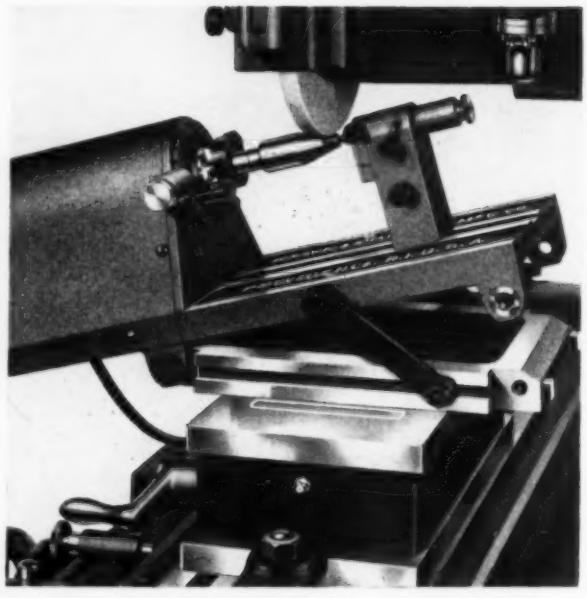
RUBBER CUSHIONED ABRASIVES

Cylindrical Grinding and Indexing Attachment



The No. 616 cylindrical grinding and indexing attachment is used for dry grinding small cylindrical work, tapers, and work requiring indexing on surface grinders. Grinding is done on dead centers. Work driving dogs with specially designed driving arms hold work without backlash, when indexing is required. For work not ground between centers an indexing spring chuck with spring collets is available, interchangeable with standard index head.

The motor is completely enclosed. Ball bearings in the index head and indexing spring chuck are permanently lubricated and sealed.

Henry Owens & Co., Inc., 51 Washington Ave., Cranston 7, R.I.

Use postpaid card. Circle No. 117

Lubricant Price Reduction

Lower production costs resulting from increased volume were credited by S. C. Johnson & Son, Inc., Racine, Wis., for making possible price reductions averaging between 25% and 30% on its cutting fluids and drawing lubricants. The lower list prices will be accompanied by a distributor and consumer promotion.

Affected will be six cutting fluids and two drawing lubricants. They include TL-131, No. 130 Wax Cool, No. 230 J-Cool, No. 121 Wax Cut, No. 122 Wax Cut, No. 123 Wax Cut, No. 150 Wax Draw and No. 151 Wax Draw. Under the new price policy No. 130 Wax Cool, for example, now sells as low as $1.80 per gallon f.o.b.; formerly it sold at $2.65 per gallon.

Use postpaid card. Circle No. 118

Fiberglass Pulley Provides for ½" & ⅜" V-Belt Drives

A self-lubricating 3¼" pulley for fhp motors has a 2.45 to 1 speed range, spring-loaded tension, and ½" and ⅜" shaft bores. An addition to the Rampe line of variable speed drive units for small-motor applications, the Model VP-2 claims to overcome many common problems of corrosion, sticking parts, and high replacement costs.

Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, Ohio.

Use postpaid card. Circle No. 119

grind . . . sand . . . polish quicker and easier!

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Grinding and finish work is completed faster . . . more economically with the powerful, easy to use Airetool equipment.

AIRETOOL HORIZONTAL GRINDERS handle the most rugged metal removal jobs. Lightweight, balanced design with long shank for handling ease. Controlled speeds up to 6000 RPM. 4" to 8" abrasive wheel.

AIRETOOL VERTICAL GRINDERS cut finish time on flat or curved surfaces. Powerful, smooth running, easy to maneuver. Capacities from 4" to 9" cup wheel, sanding disc or wire wheel.

ABRASIVE BELT attachment on Horizontal models for finish welds, seams and contours.

Write for Pneumatic Tool Catalog No. 63.

REPRESENTATIVES: in principal cities of U.S.A., Canada, Mexico, Puerto Rico, South America England, Europe, Italy, Japan, Hawaii.

EUROPEAN PLANT: Vlaardingen, The Netherlands.

CANADIAN PLANT: 37 Spalding Drive, Brantford, Ontario.

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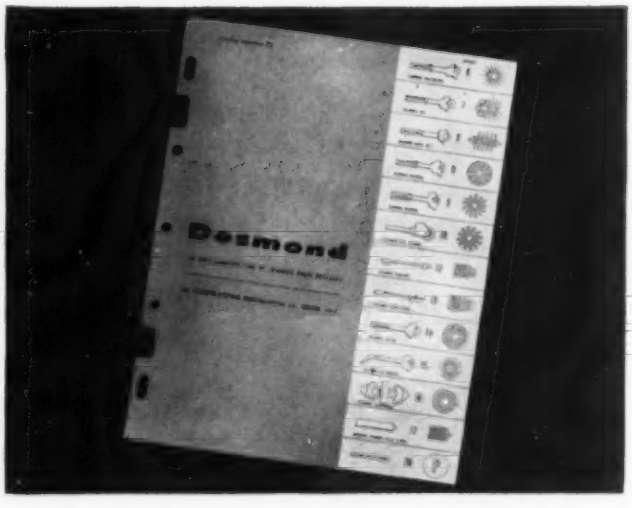

More pieces ground per hour, more pieces per wheel . . . yours if you dress your grinding wheels regularly. Desmond dresser catalog free on request.

The only complete line of grinding wheel dressers and cutters

Desmond

THE DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Contact Wheel

The R-57 rubber contact wheel has a self-aligning rubber molded arbor hub. The wheel aligns by centrifugal force, does not vibrate, and needs no aligning even when spindles are worn. The rubber hub helps to avoid vibration.

Chicago Rubber Co., Inc., Waukegan, Ill.

Use postpaid card, Circle No. 120

Filtered Fresh Air Furnished to Confined Areas

A portable, self-contained unit, known as Filtairvent, employs a positive pressure impeller to deliver a rated 560 cfm of air through a 20' length of synthetic fabric hose. Contained within the hose is a 6' long flameproofed filter which permits operation in average dusty conditions with negligible loading. The unit is for use in ventilating wing, fuselage, manholes, cableway compartments, tanks, vats, drums, etc.

For portability and storage the filter-hose combination can be wadded down into compact size. The hose is claimed to be tear-proof in usual service, and in addition to being inert to oils, greases, and most chemicals, will not soak up fluids.

Dustender Co., 3642 Pontiac Rd., Ann Arbor, Mich.

Use postpaid card, Circle No. 121

HOW RUGGED STEEL GRATING IS CUT TO FIT intricately patterned shapes is illustrated. It is done at Blaw-Knox Company, one of the nation's largest grating manufacturers, with saws like the one shown here. This saw will cut grating in various widths of up to 3' wide and from ¾" to 2¼" depth. Blaw-Knox Co., 300 6th Ave., Pittsburgh 22, Pa.

Use postpaid card, Circle No. 122

Superior Coated Abrasive Products

A line of superior coated abrasive products for the woodworking, leather, and plastic industries have been found through field usage to give better production and finishing results according to the announcement. In one field test it was found the Superkut Garnet 120 grit J weight open coat cut production time of a mold edging belt operation one full day, it was said.

Armour and Co., Coated Abrasives Div., Alliance, Ohio.

Use postpaid card, Circle No. 123

MISTKOP STOPS MIST

COLLECTS MIST-FOG EFFECTIVELY IN A SMALLER SPACE

This efficient Mistkop unit provides low-cost mist control for all machining operations employing coolants or lubricants. Requires no duct work or costly piping—*is actually portable!*

Mistkop is sturdy in design—has a minimum number of parts and gives long, trouble-free service. Stops clouding of lights . . . eliminates fire hazards of uncontrolled mist. Write for detailed description.

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THROW-AWAY APPLICATOR FOR ACME SUPER-LAP DIAMOND COMPOUND

More brilliant micro finishes are achieved with Super-Lap...

- Diamond is pure—assuring faster cutting
- Diamond is more uniform in size and shape
- Diamond particles are more uniformly suspended

All orders for diamond compound now supplied in a free plastic throw-away applicator, in 5 gram and 18 gram sizes. Each applicator is color coded with grade shown; an air seal cap is provided for protection when not in use.

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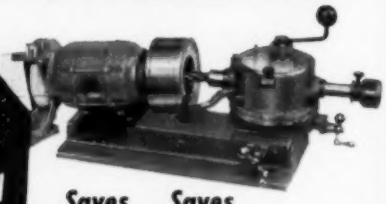
SHARPENS END MILLS Quickly... Completely IN YOUR OWN SHOP



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MODEL B943 MOTOR DRIVEN WORK HEAD

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K. O. Lee Company, Aberdeen, S. D.

STEELSET

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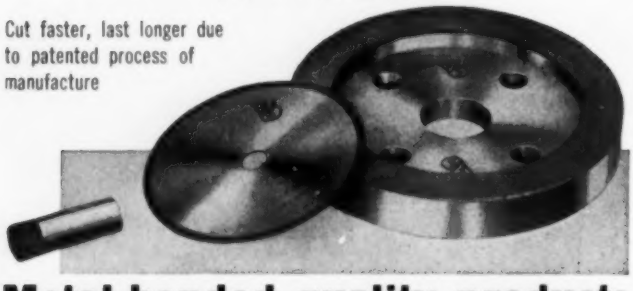
DIAMOND WHEELS

(FOR WET GRINDING)

Cut faster, last longer due to patented process of manufacture



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Generating	Ceramics, Porcelain
Pencil edging	Sapphire
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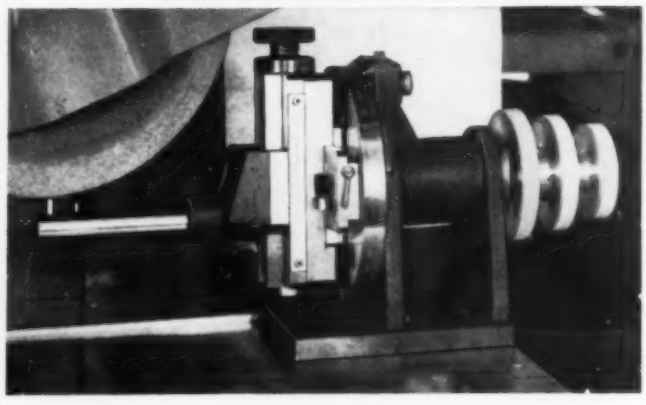
Write for Catalog DT-353

Fish-Schurman Corp., 81 Portman Road, New Rochelle, N.Y.



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in half the time with the direct reading

TANGI-MATIC DRESSER

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- dresses any combination of tangents and/or radii
- no special skill required to do precision dressing
- greater accuracy thru bottom dressing method

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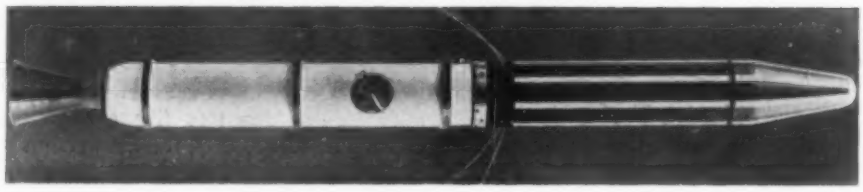
THREADWELL TAP & DIE CO. Greenfield, Mass.

News of Industry

Ceramic Coating Protects "Explorer"



Army's "Explorer"—First U.S. earth satellite, showing instrument section and nose cone with stripes of Norton Rokide "A" ceramic coating.

Since the successful January 31 launching of the first American earth satellite, Norton Rokide ceramic coating has played an important role in the orbital flight of the Army's "Explorer."

The leading surfaces of the satellite package are partially covered with an aluminum oxide coating called ROKIDE "A". Scientists at Jet Propulsion Laboratory, California Institute of Technology, have used this coating to assist in controlling the temperature of the instrumentation inside the satellite. It was sprayed on in stripes along the outside of the instrument vehicle, from the nose cone down to the fourth stage rocket motor section.

Basically the same material used in some of Norton Company's grinding wheels and refractory products, the coating is also the same brand of pure aluminum oxide sprayed on the inside skins of rocket nozzles.

Accuracy Through Regular Gage Inspection

One answer to many of the problems caused by the current trend toward tighter production-part tolerances lies in better inspection methods based on adequate and proper use of gage blocks, according to officials of the Aircraft Div., Holley Carburetor Co. At the Detroit headquarters of this manufacturer, working to within 50 millionths of an inch on a production basis is a requirement on many different parts.

Working closely with their gage block supplier, Holley's Aircraft Div. insists upon regular inspection of the more than 50 sets of gage blocks they keep in constant use. Maximum inspection interval is six months, but many are checked more frequently, depending upon usage.

The supplier, Ellstrom Standards Div., Dearborn Gage Co., Dearborn, Mich., inspects each block, and certifies, on a special inspection report form, its accuracy to within a millionth of an inch. Such certification includes deviation from nominal size (measured length of the block), and errors in flatness or parallelism which exceed the specified tolerances for such dimensions. Blocks exceeding the specified limits of accuracy are automatically replaced, and the deviation from nominal size recorded for the replacement.

Wheelabrator Provides $100,000 for Graduate Study

Announcement of a $100,000 educational grant from Wheelabrator Foundation to the Foundry Educational Foundation was the highlight of first-day sessions of the F.E.F. College-Industry Conference held Wednesday and Thursday, March 12 and 13, in the

Gage blocks and an air gage are used on this production inspection operation, to check within 2 ten-thousandths of an inch tolerance, the distance between valve ports on a sleeve used in jet engine control units.

Hotel Statler, Cleveland, Ohio.

The major provision of the grant is for fifty fellowships of $1,500 each to be distributed during the next ten years. The remainder of the grant, $25,000, can be used by F.E.F. for fellowships, scholarships, or other educational purposes.

Precision Balls to Operate Under High Temperature

The Hartford Steel Ball Co., Inc. is now producing a wide range of balls that will operate at elevated temperatures. Alloys that have proven most suitable for high temperature uses include T-1, T-2, T-5, M-2, etc. Balls are made to tolerances as close as ten millionths of an inch.

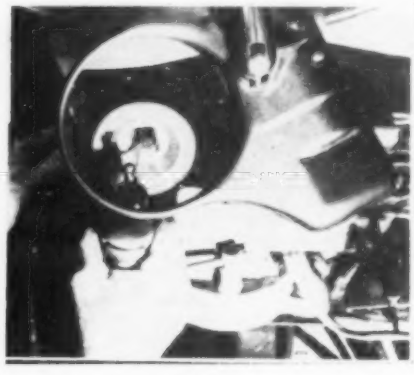
Size Control Dept. Makes Special Gages in Quantity

Shown is a row of precision surface grinders, operated by experienced men in industry.

Size Control Co., Chicago, has set up a new gage department for the manufacture of special gages and precision parts in limited or production quantities. Special gages and parts can be produced with the extremely close tolerances of down to five millionths of an inch (.000005"), the firm claims. Such close tolerances are often required in the manufacture and inspection of missile, rocket, and aircraft parts.

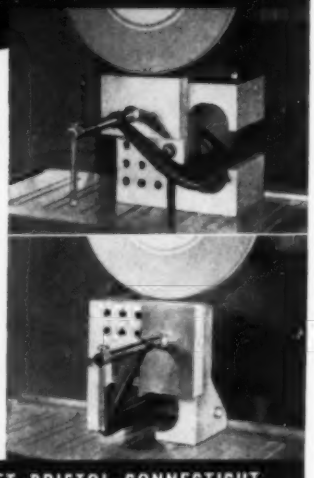
The department can make special gages to exact customer specifications, or will submit designs for approval, prior to manufacturing, for special applications including automation.

Some of the products regularly produced by the new special gage and parts department include jigs, fixtures, flush pin gages, ID and OD length gages, etc. It is also able to produce special targeting gages as well as plain tapered ring and plug gages.



HAND POWER TOOLS get a workout in the cemented carbide die making plant of Bronson & Bratton, Inc., Chicago. View here, through this precision worker's magnifying glass, shows the hand polishing involved with a reciprocating tool on the large end of a special shaped Carboloy carbide die. Used for drawing wire with cross sections other than round, such special shape dies require more time to produce, but are said to lessen machining costs. (Report from Metallurgical Prod. Dept., Gen. Elec. Co., Detroit)

NEW Federal Square Master ANGLE PLATE



Will Grind A Work Piece Square The Easy Way Without Skilled Help

Designed for grinding a work piece to exact squareness, whether it be a component of a jig, fixture, gauge, or die; eliminating an indicator, precision square, surface plate, and use of top skilled help on routine jobs. Can also be used on layout work and inspection. This precision tool is built of high grade steel, stabilized, hardened and ground. ALL WORKING SURFACES ARE GUARANTEED TO BE SQUARE within two-tenths of a thousandth . . . (.0002). Write for complete literature describing other outstanding features.

Note adjustable set edge and recess for C-clamp. ➔

FEDERAL MACHINE TOOL COMPANY, EMMETT STREET, BRISTOL, CONNECTICUT

get ALL universal features plus real economy . . .

STERLING "G-2" *Universal* TOOL & CUTTER GRINDER

Sterling Features include . . .

- **25° Tilting Spindle**
- **360° Spindle Rotation**
- **Anti-Friction Table**
- **180° Table Swivel**
- **2 Speed Table Traverse**
- **10¾" Swing Over Table**
- **Rugged Construction**

Accuracy, Long Life and Low Upkeep are Built-In

From the heavy cast, vibration damping, base to the two speed motorized tilting spindle the STERLING "G-2" is built for easy operation and maximum accuracy. Set-ups can be made faster on a wider variety of jobs because of the built-in versatility of the STERLING "G-2". Work is finished more accurately, too, because of the built-in stability.

For maximum capacity, versatility and accuracy with minimum investment, investigate the STERLING "G-2" Universal Tool & Cutter Grinder. Plain grinder also available. Ask your STERLING Dealer or write direct for details.

McDONOUGH MANUFACTURING CO.

1522 GALLOWAY EAU CLAIRE, WISC.

Automation for Grinding Piston Pins

The six No. 12 Landis centerless grinders pictured automatically finish grind 2100 automotive piston pins per hour, according to announcement from Landis Tool Co., Waynesboro, Pa. They are loaded from an elevator type loader and tooled for thrufeed operations.

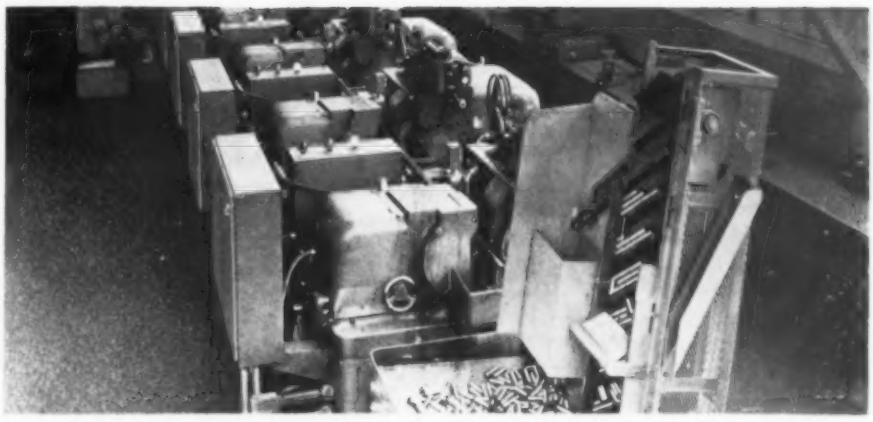
The loader in the foreground receives the heat-treated piston pins, previously rough ground on a Landis No. 12½ centerless. Pins are automatically loaded on the No. 1 grinder in the line, ground to predetermined size, then moved on to the No. 2 grinder, etc. Chain-type conveyors carry the pieces between the machines, producing a continuous flow of ready-to-assemble piston pins. Through the entire line of machines .008" to .009" of stock is removed from the piston pins with a final tolerance of —.0002" on diameter and .0001" for roundness and straightness. Finish is 4 micro-inch, measured on a profilometer.

Each machine has different grain and grade wheels to progressively remove less stock and grind to better finishes.

The first four machines in line are connected to a central coolant system, but because of the finish requirements, the No. 5 and No. 6 machines use a special coolant.

Warning lights flash on to let the operator know if a piece is over or under size.

TOP TWO MAYTAG SUPERVISORS, on the basis of participation in the company's work simplification program, receive certificates from Fred Maytag II, president of the Maytag Company, at the third annual Work Simplification Recognition dinner held February 24 by the Industrial Engineering Department. Maytag (left) presents certificates to Lloyd Scoville, top supervisor at Plant 1, and Ray Owens (right), leading supervisor at Maytag's Plant 2. Over a million dollars total cost reduction in the program and the Employes' Idea plan during 1957 was announced at the dinner, a new record for Maytag.



Gilmore Diamond Tools

These Needle-Point Diamonds are used on wheels for grinding taps, thread gauges, etc.

from $150 up

Write for Illustrated 32 page catalog.

F. F. GILMORE & COMPANY 725 BOYLSTON ST. BOSTON 16, MASS.

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OVER 60 YEARS OF SERVICE TO INDUSTRY

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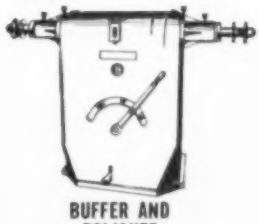
FOR ALL INDUSTRIAL USES

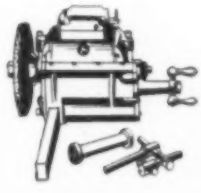
Electrically and mechanically correct. All rotating parts and spindles are precision-balanced dynamically by latest electronic equipment.

PRECISION LATH

VERTICAL SPINDLE



BUFFER AND POLISHER



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USE IT EITHER WAY

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complete with cord, plug, switch ready to use **$89.95**

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Bryant Joins The Ex-Cell-O Organization

As of February 1, 1958, **Bryant Chucking Grinder Co.** became a subsidiary of **Ex-Cell-O Corp.**

Bryant was organized in Springfield, Vermont in 1909. Its chief products are machine tools, specifically, internal grinders. As part of the Ex-Cell-O organization, Bryant will continue to operate under its present management. It is felt that through the combination of facilities and skills the products of Bryant can be expanded, with benefit both to Bryant and Ex-Cell-O.

Branch-Merwin Tool Specialists have been assigned the distributorship for the Size Control Co. in the territories of Ark., Miss., Ky. (except Louisville and its suburbs), and the western part of Tenn.

According to E. E. Olds, general sales manager of Size Control Co., the experience of W. B. Branch and C. W. Merwin in the field of precision gages and tools have made their company a reliable and competent name in the area.

Industrial Supplies of Worcester, Inc., 212 Summer St., Worcester 8, Mass., have been appointed authorized distributor for **Bay State Abrasive Products Co.,** Westboro, Mass. They will cover the Central Massachusetts area.

Precision Grinding Wheel Co., Inc. of Philadelphia, Pa., announces the establishment of a factory branch office. **The Precision-Dixie Co.,** at Birmingham, Ala. This move is necessary to provide improved service and storage facilities for this fast-growing industrial area.

William F. Schlick has been appointed general sales manager of Sterling Grinding Wheel Co., Tiffin, Ohio. He was formerly western regional sales manager for the same company.

James Jarvie has been named as general sales manager of Ex-Cell-O's Industrial Sales Organization in Canada. In this capacity Jarvie will guide the sales operations of the industrial products of both Ex-Cell-O of Canada in London, and Colonial Tool Co., an Ex-Cell-O subsidiary in Windsor.

J. Jarvie, Gen. Sls. Mgr., Ex-Cello-O Corp.

J. D. Kreager, Sls. Mgr., Engelberg Huller Co.

New, Lightweight, Powerful

FLEXIBLE TOOL SHAFT

Connects To Any Motor

Stow flexible tool shafts increase precision, eliminate operator fatigue on production grinding, polishing, sanding and other finishing operations in which the operator must hold the tool for long periods of time. Up to 3 HP can be transmitted through these new tool shafts, which consist of a core made of highest grade music wire rotating inside a rubber-covered casing. Each shaft furnished with ball bearing motor connection and high-speed ball bearing handpiece with removable wheel Arbor having ½-20" threads. An angle head can be used in place of the handpiece as shown in the photograph.

Four Sizes of these shafts are available . . . models 38, 40, 50 and 63, which come in 6-foot standard lengths. The largest shaft, model 63, will handle 3 HP at speeds up to 6900 RPM and has a maximum capacity for various accessories as follows: grinding wheel, 8" x 1"; buffing wheel, 8" x 1"; sanding disc, 9" diameter; sanding drum, 6" x 2½"; wire brush, 8" x 2"; steel drills, ½" diameter.

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James D. Kreager has been promoted to the position of sales manager of the Engelberg Huller Co., Inc., Abrasive Machine Div. In his new post, he will direct activities of the nationwide sales force and will make his headquarters at the home office.

T. P. Gallagher, Plant Eng. The Fuller Merriam Co.

E. A. Rogers, Field Eng. Chicago Dist. Office, Norton Co.

Thomas P. Gallagher has been appointed plant engineer of The Fuller Merriam Co.

Edward A. Rogers has been appointed a field engineer at Norton Co.'s Chicago district office. A graduate of the Univ. of Southern Calif., he joined Norton Co. in March 1957 as a sales trainee.

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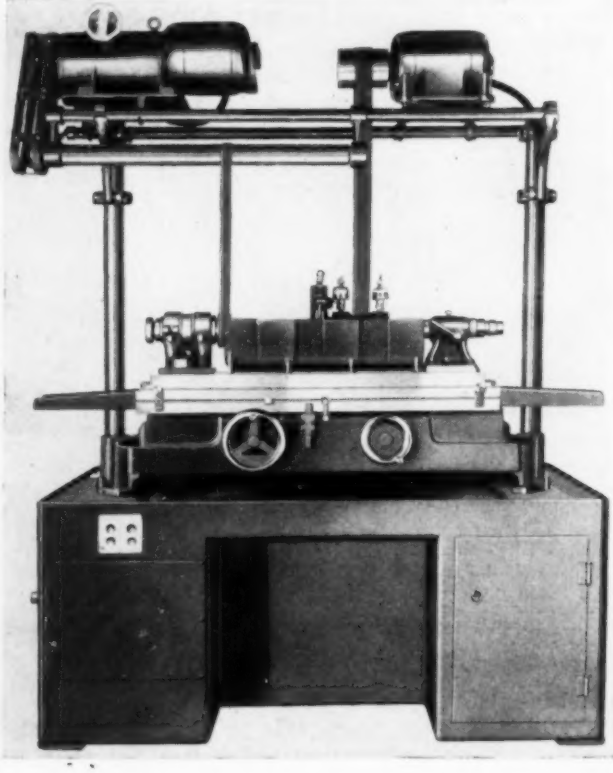

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Index to Advertisers in April Issue

TO OBTAIN INFORMATION FROM ANY OF THESE ADVERTISERS, FIND THE BOLDFACE KEY NUMBER *PRECEDING* THE ADVERTISER'S NAME . . . AND CIRCLE THAT NUMBER ON ACTION CARD AT RIGHT

Circle No.		Page No.
201	Abrasive Products, Inc.	55
202	Ace Abrasives Laboratories	79
203	Acme Scientific Company	73
204	Aget Manufacturing Company	73
205	Airetool Manufacturing Company	72
206	Alsop Engineering Corporation	8
207	American Herforder Corporation	70
208	Atlantic Abrasive Corporation	69
209	Barnes Drill Company	10
210	Bay State Abrasive Products Company	14, 15
211	Bearings, Inc.	54
212	Beavercut Rotary File Company	79
213	Blanchard Machine Company, The	44
214	Boyar-Schultz Corporation	52
215	Brightboy Industrial Div., Weldon Roberts Rubber Co.	71
216	Brown & Sharpe Manufacturing Company	4th Cover
217	Bryant Chucking Grinder Company	16
218	Chicago Rubber Company, Inc.	56
219	Chicago Wheel & Mfg. Co.	59
220	Cincinnati Grinders, Inc.	2, 3
221	Cincinnati Milling Machine Company (G. W. Division)	30
222	Cleveland Grinding Machine Company, The	57
223	Clover Manufacturing Company	41
224	Coolant Equipment Corporation	80
225	Cortland Grinding Wheels Corporation	5
226	Crystal Lake Grinders	80
227	Dalzen Manufacturing Company	50
228	Desmond-Stephan Manufacturing Company	72
229	Diamond Products, Inc.	58
230	Diamond Research Laboratories (Industrial Distributors, Ltd.)	42, 43
231	Electro-Matic Products Company	65
232	Exolon Company	7
233	Federal Machine Tool Company	76
234	Fish-Schurman Corporation	74
235	Gilmore, F. F., & Company	77
236	Golconda Sales Corporation	17
237	Grinding & Polishing Machinery Corp.	79
238	Hill Acme Company	18
239	Hilliard Corporation	46
240	Houghton, E. F., & Company	80
241	Industrial Distributors, Ltd. (Diamond Research Laboratories)	42, 43
242	J & S Tool Company, Inc.	4
243	Kirk & Blum Manufacturing Company	48
244	Lee, K. O., Company	74
245	Mattison Machine Works	2nd Cover
246	McDonough Manufacturing Company	76
247	Miller, Harry, Corporation	60
248	Minnesota Mining & Manufacturing Company	11
249	Moore Special Tool Company, Inc.	66
250	Murray-Way Corporation	16a
251	North American Mogul Products Company	48a
252	Norton Company	13, 16b & 16c
253	Peninsular Grinding Wheel Division	3rd Cover
254	Pratt & Whitney Company, Inc.	53
255	Precise Products Corporation	62, 63
256	Rampe Manufacturing Company	78
257	Reid Bros. Company, Inc.	16d
258	Richard-Lewis Corporation	79
259	Rivett Lathe & Grinder, Inc.	12
260	Robbins, Omer E., Company	51
261	Simonds Abrasive Company	9
262	Smit, J. K., & Sons, Inc.	64
263	Spiral Step Tool Company	74
264	Stow Manufacturing Company	78
265	Sun Oil Company	48b, c
266	Thompson Grinder Company	48d
267	Threadwell Tap & Die Company	74
268	Timesaver Sanders	68
269	U. S. Diamond Wheel Company	49
270	U. S. Electrical Tool Company	77
271	Vulcan Tool Company	39
272	Walls Sales Corporation	78
273	Weldon Roberts Rubber Co., Brightboy Industrial Div.	71
274	White & Bagley Company	47

Handy Information Cards

THE two postpaid post cards at the right are to help you obtain information about products advertised in this issue. These cards provide key numbers for you to circle to get information about any new product item, free literature item or advertisement published in this issue. New product and literature items are numbered where they appear. For information about any advertisement, simply find the manufacturer's name in the Advertising Index above, note the boldface number preceding the name and circle that number on the Action card. Before sending the card, please check to see that you have included your name and address.

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LITERATURE:			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
SHOW:			34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91											
NEW PRODUCTS:					101	102	103	104	105	106	107	108	109	110	111		
112	113	114	115	116	117	118	119	120	121	122	123	124	125				
126	127	128	129	130	131	132	133	134	135	136	137	138	139				
140	141	142	143	144	145	146	147	148	149	150	151	152	153				
154	155	156	157	158	159	160	161	162	163	164	165	166	167				
ADVERTISEMENTS:			201	202	203	204	205	206	207	208	209	210	211	212			
213	214	215	216	217	218	219	220	221	222	223	224	225	226	227			
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242			
243	244	245	246	247	248	249	250	251	252	253	254	255	256	257			
258	259	260	261	262	263	264	265	266	267	268	269	270	271	272			
273	274	275	276	277	278	279	280	281	282	283	284	285	286	287			
288	289	290	291	292	293	294	295	296	297	298	299	300	301	302			
303	304	305	306	307	308	309	310	311	312	313	A1	A2	A3	A4			

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LITERATURE:			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
SHOW:			34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91											
NEW PRODUCTS:					101	102	103	104	105	106	107	108	109	110	111		
112	113	114	115	116	117	118	119	120	121	122	123	124	125				
126	127	128	129	130	131	132	133	134	135	136	137	138	139				
140	141	142	143	144	145	146	147	148	149	150	151	152	153				
154	155	156	157	158	159	160	161	162	163	164	165	166	167				
ADVERTISEMENTS:			201	202	203	204	205	206	207	208	209	210	211	212			
213	214	215	216	217	218	219	220	221	222	223	224	225	226	227			
228	229	230	231	232	233	234	235	236	237	238	239	240	241	242			
243	244	245	246	247	248	249	250	251	252	253	254	255	256	257			
258	259	260	261	262	263	264	265	266	267	268	269	270	271	272			
273	274	275	276	277	278	279	280	281	282	283	284	285	286	287			
288	289	290	291	292	293	294	295	296	297	298	299	300	301	302			
303	304	305	306	307	308	309	310	311	312	313	A1	A2	A3	A4			

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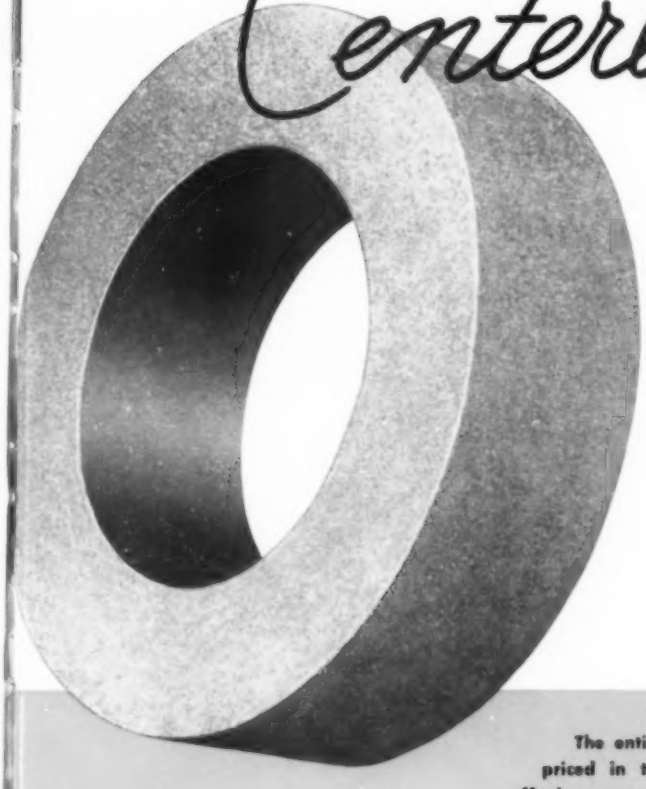
PENINSULAR *Centerless* GRINDING WHEELS



Use these superior abrasive wheels on those operations where you wish extra-close tolerances, a longer lasting wheel, a good free grinding, closer action to achieve your highest standards of workmanship . . .

Invite your Peninsular abrasive engineer to prove the matchless superiority of these engineered grinding wheels right on your jobs where definite comparisons can be made . . . where you can sell yourself on the many reasons Peninsular's best!

Thousands recommend Peninsular. We'd like to add your name to the constantly growing list. Write us or your nearby Peninsular distributor at no obligation, of course!

The entire Peninsular line is described and priced in the new catalog No. 50, just off the press. Send for your free copy.

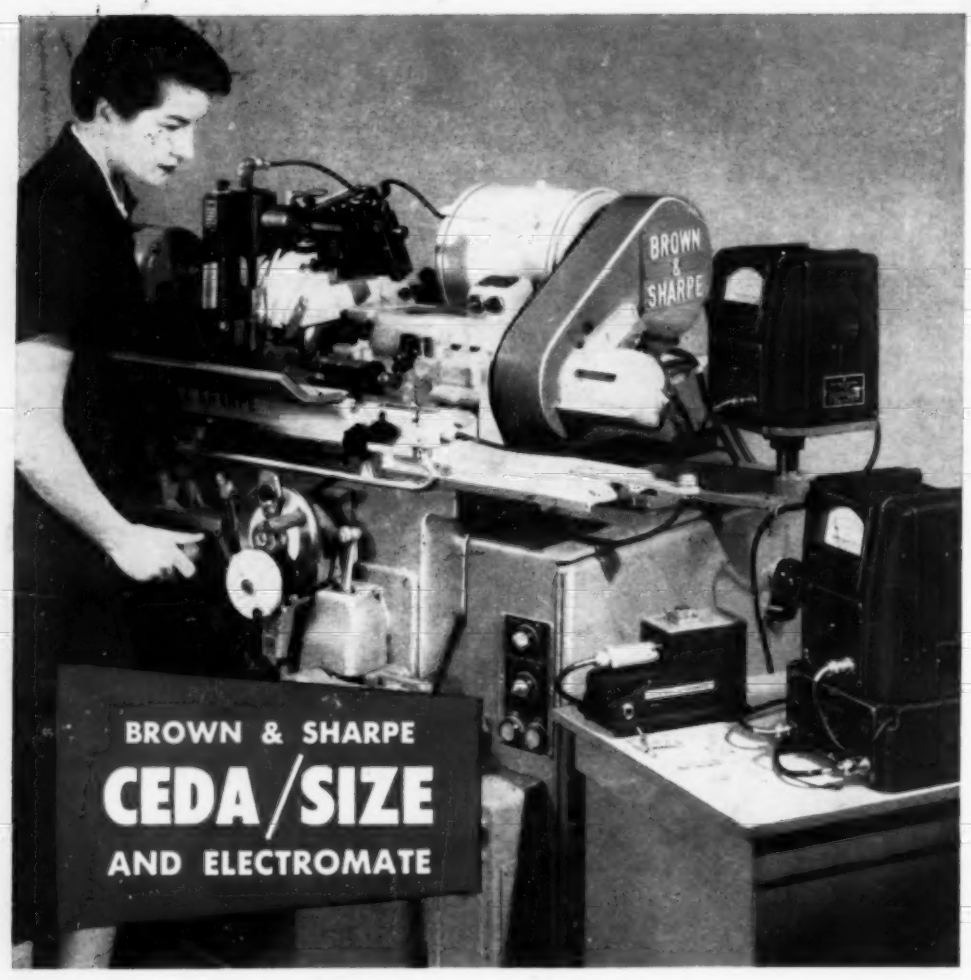
PENINSULAR

GRINDING PENINSULAR WHEELS

District Representatives and Distributors in All Principal Cities

PENINSULAR GRINDING WHEEL DIVISION—ABRASIVE AND METAL PRODUCTS CO.—DETROIT, MICH.

Grinding to ±0.000010" or less
in production – with average operators



...clearance of mating parts held to ±0.000020" or less

NOW . . . from Brown & Sharpe—comes the answer to space-age precision demands . . . the new CEDA SIZE arrangement for the No. 5 Plain Grinding Machine, and the ELECTROMATE attachment.

With electronic efficiency, CEDA SIZE saves you the extra time and exceptional skills now devoted to lapping and other methods of precision sizing. You get exact duplication, within a few millionths, on high precision parts needed for missiles, fuel injectors, instruments, etc.—on a *production* basis, with operators of limited experience.

Find out how CEDA SIZE can solve your toughest "tolerance headaches." For full information, write: Brown & Sharpe Mfg. Co., Providence, R. I.

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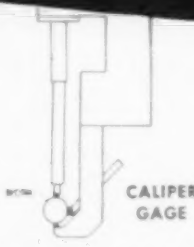
Brown & Sharpe

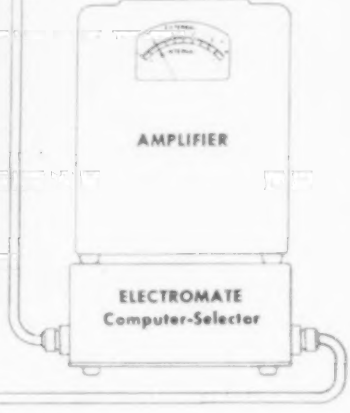
MILLING, GRINDING, AND SCREW MACHINES

MACHINE TOOL ACCESSORIES • PRECISION TOOLS • HYDRAULICS • CUTTERS

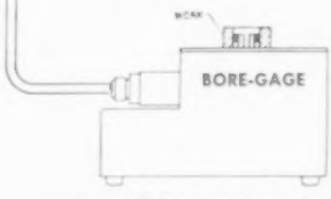
millionths for missiles



With the CEDA SIZE equipped B&S No. 5 Plain Grinding Machine, diameter readings are transmitted to Amplifier from Electronic Caliper Gage riding on work. When diameter is within about fifty millionths of finished size, CEDA SIZE lever is depressed, which produces and controls an extremely fine grinding feed. When Amplifier indicator reaches zero, the specified size has been duplicated to ±0.000010" or less.



The ELECTROMATE Computer-Selector attachment, when used with CEDA SIZE, automatically computes the differential between the internal diameter of the mating sleeve (set on Electronic Bore Gage) and the external diameter of the part being ground. When indicator reaches zero, clearance (preset with masters) has been duplicated to ±0.000020" or less.



In addition to CEDA SIZE and ELECTROMATE the No. 5 Plain Grinding Machine shown is also fitted with ELECTRALIGN (upper rear amplifier) to insure easy, accurate control of taper.